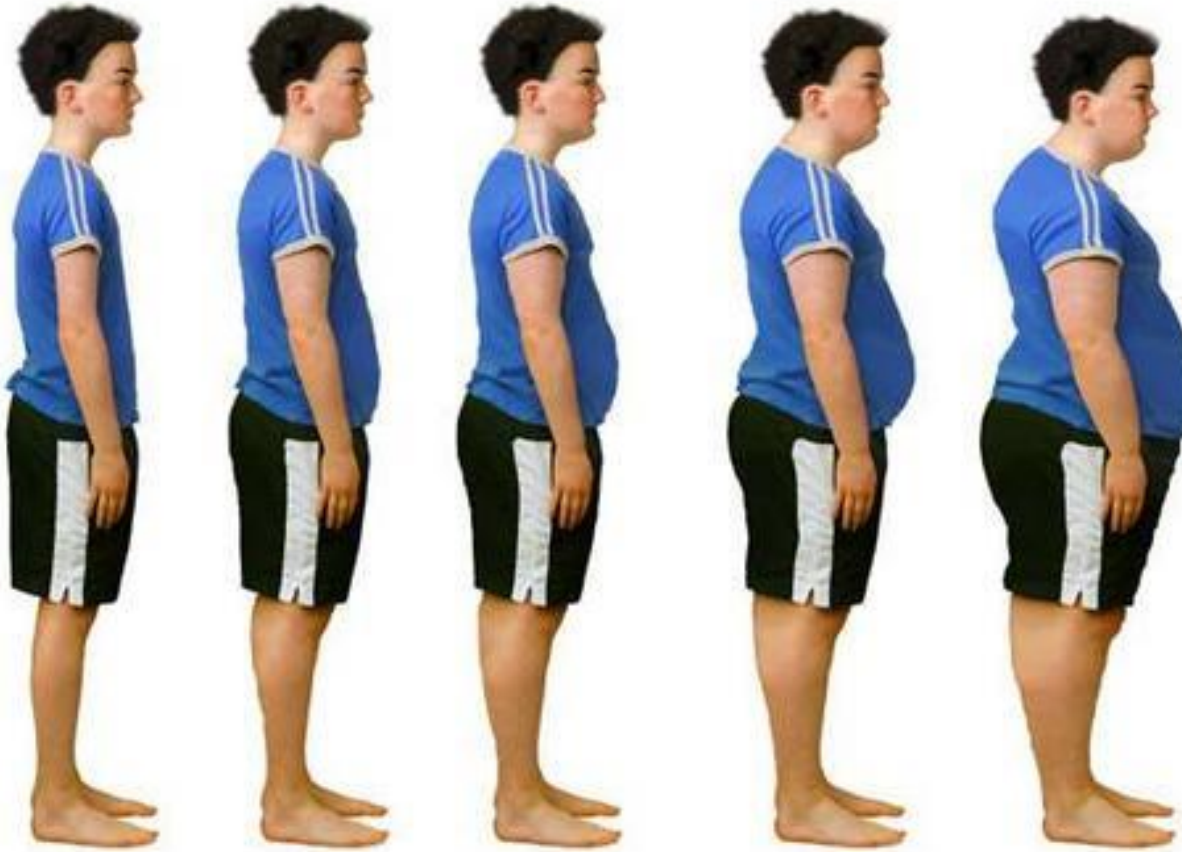
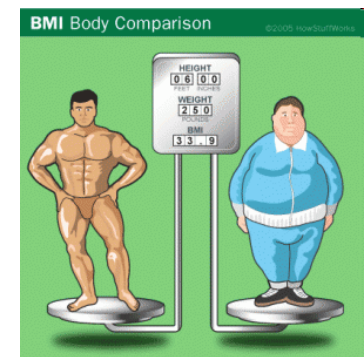


Body Composition and Physical Activity



BMI vs. Body Composition

- ◆ Because height and weight are usually known, BMI is a commonly used research instrument
- ◆ Although BMI is a good estimate of overall fatness in a population, it is not ideal for understanding individual body composition status and is not sensitive to level of fitness, maturational stage, sex, and race
- ◆ The same BMI may represent very different body composition profiles
- ◆ Body composition (% body fat) has greater value when counseling your individual patient



Body Composition

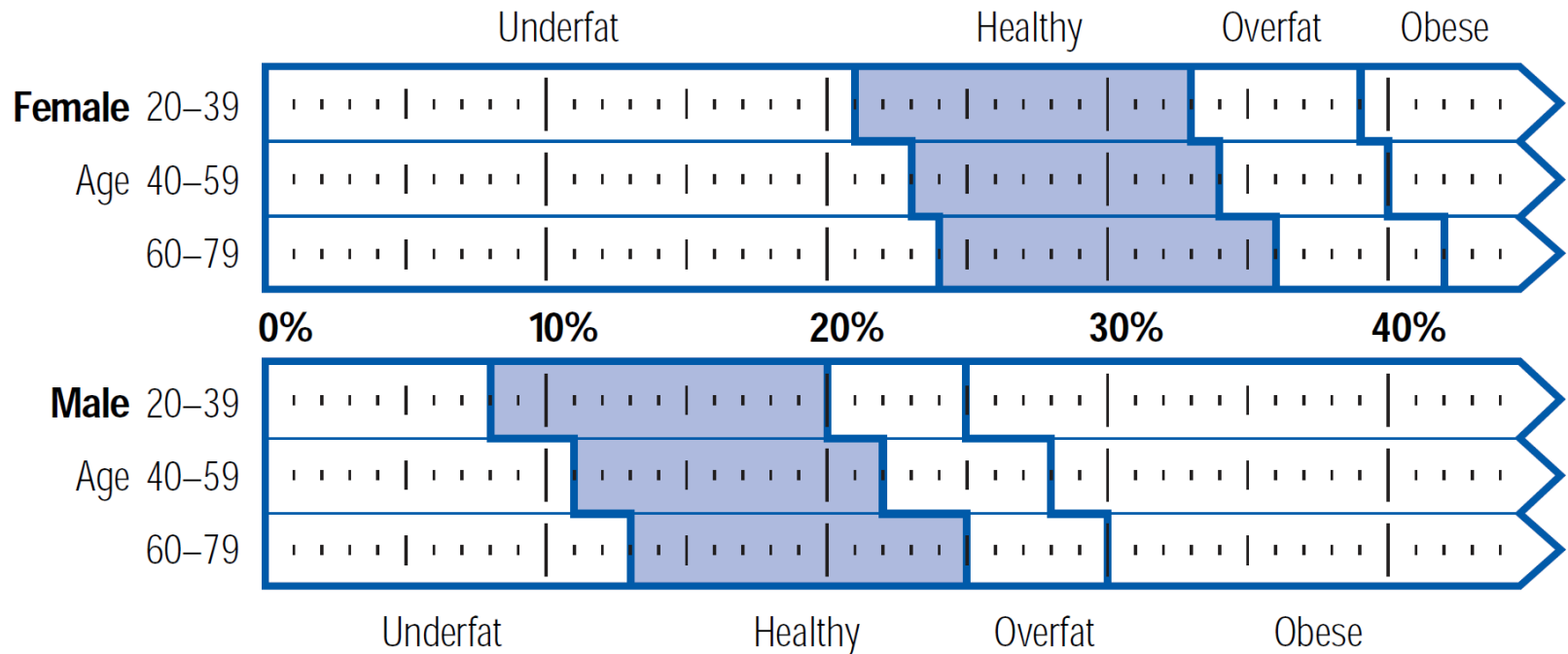
- ◆ Body composition is the ratio between fat mass and fat-free mass
- ◆ Fat-free mass includes all tissues exclusive of fat (muscle, bone, organs, fluids)
- ◆ Essential fat is necessary for normal biological function:
 - ◆ 3–5% for men
 - ◆ 8–12% for women
- ◆ The higher female requirement is related to fertility and childbearing. If body fat drops too low, the woman may stop menstruating.

Body Composition

- ◆ Obesity is overfatness or adiposity
- ◆ Obesity in men is defined as:
 $\geq 25\%$ body fat (not BMI)
- ◆ Obesity in women is defined as:
 $\geq 32\%$ body fat (not BMI)



Healthy Body Fat Ranges

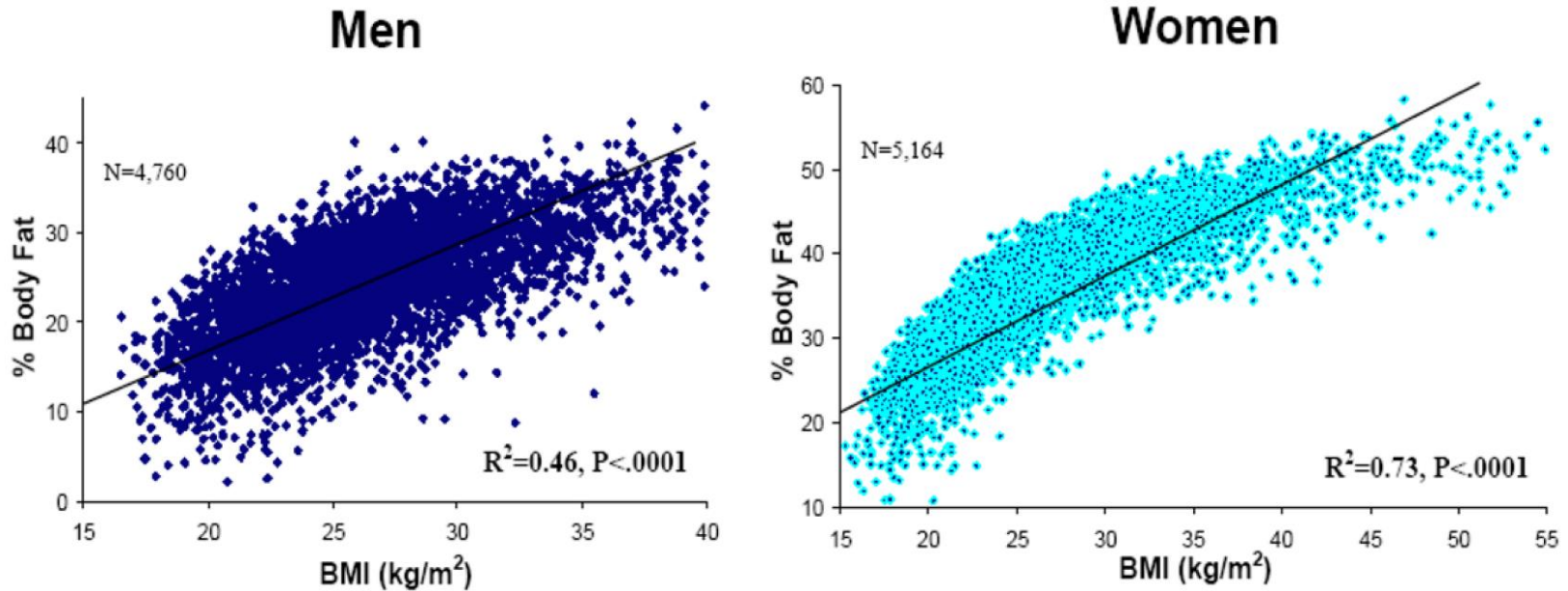


¹ Based on NIH/WHO BMI Guidelines.

² As reported by Gallagher, et al., at NY Obesity Research Center.

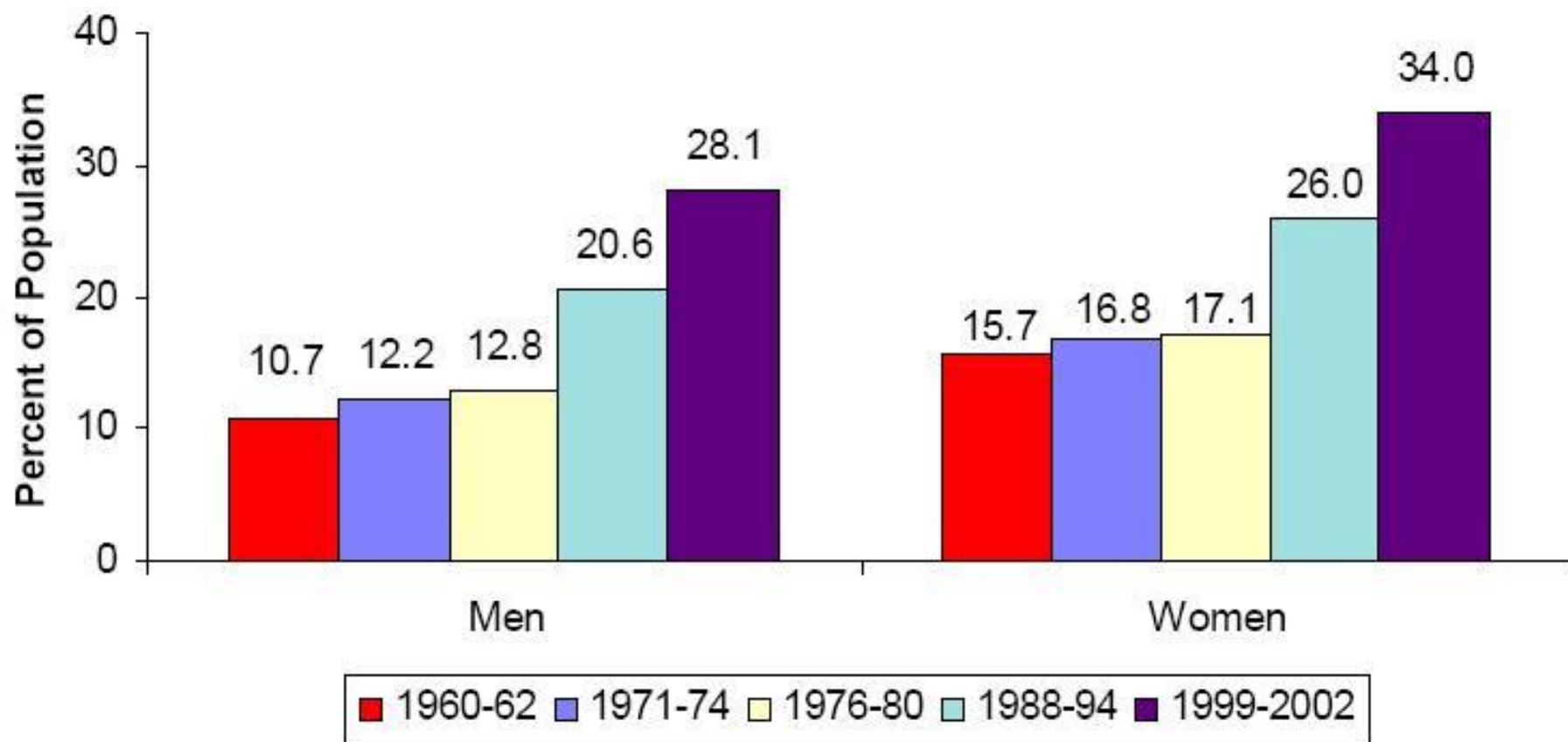
To determine the percentage of body fat that is appropriate for your body, consult your physician.

Accuracy of BMI vs. Body Fat Percentage



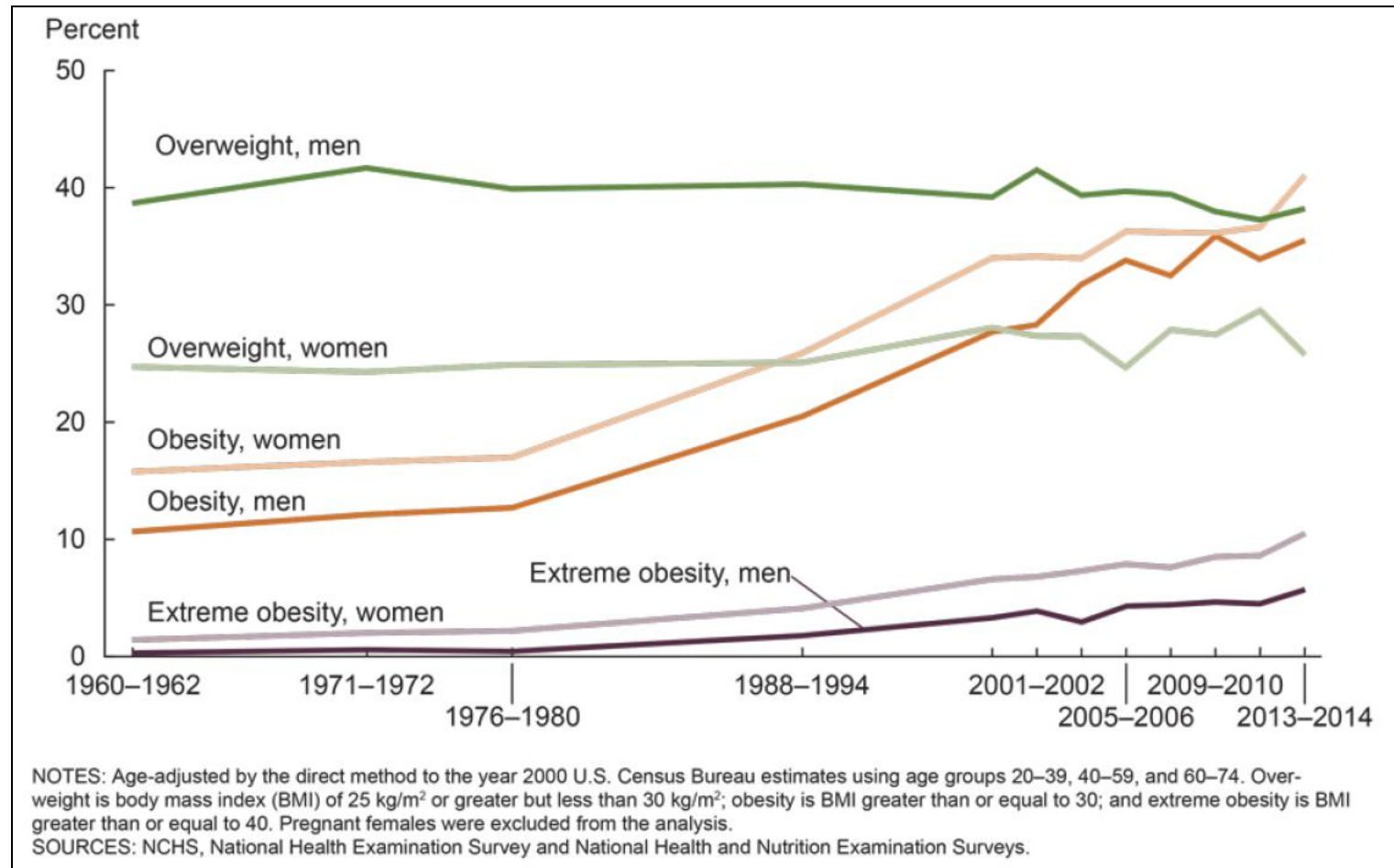
- ◆ 13,601 subjects (age 20–79.9 years; 48% men)
- ◆ Bioelectrical impedance analysis was used to estimate body fat %
- ◆ BMI ≥ 30 had a high specificity (95% in men and 99% in women), but a poor sensitivity (36% and 49 %, respectively) to detect body fat defined obesity
- ◆ The diagnostic performance of BMI diminished as age increased

Prevalence of Obesity (BMI > 30) in Americans Ages 20–74



Source: CDC NHES and NHANES

Trends in adult overweight, obesity, and extreme obesity, 1960–2014



Obesity is a Complex Issue

Social & Cultural:

Portion size, Eating on the run, Poor food choices

Economic:

Access to healthy food, Junk food often costs less

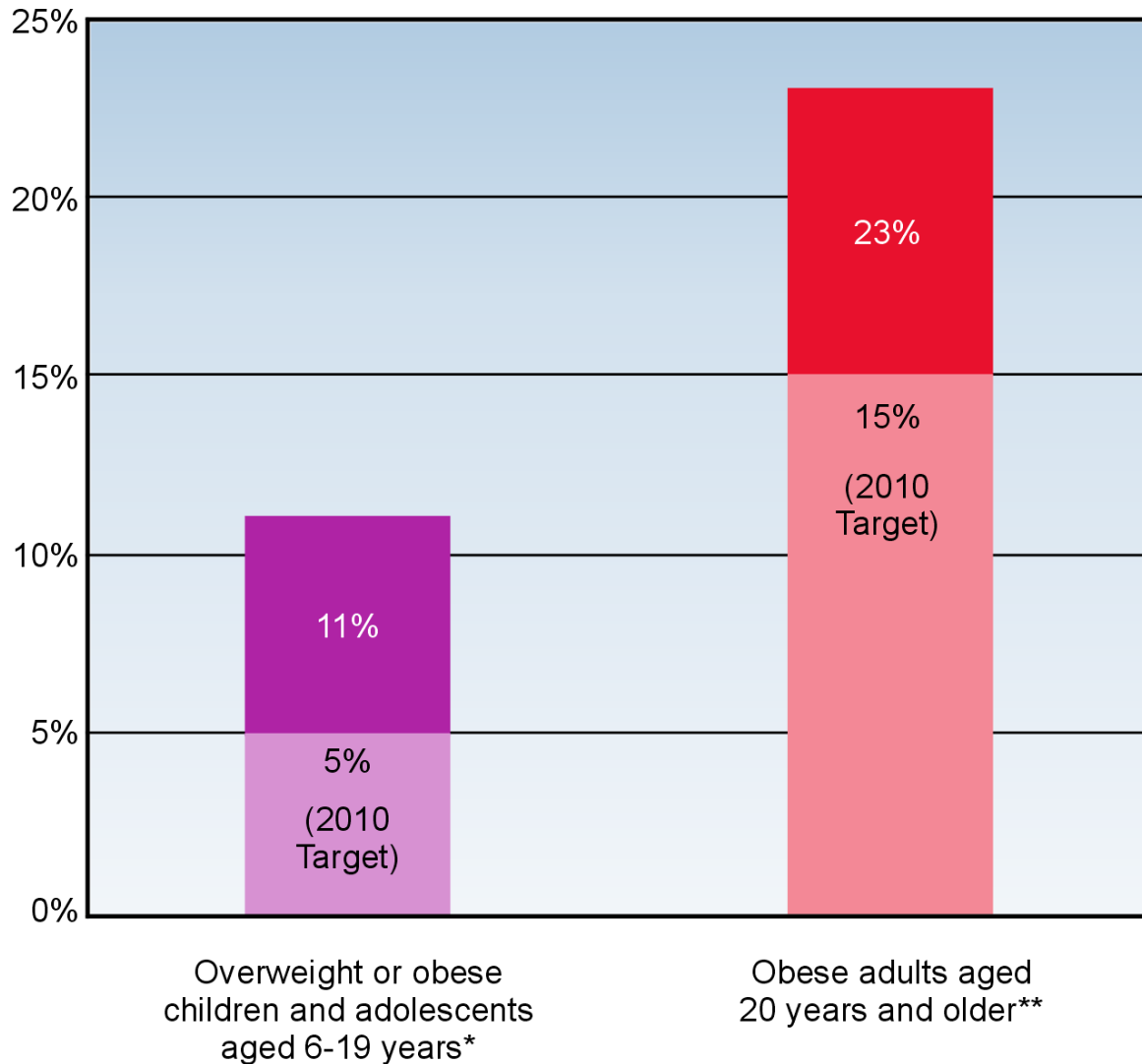
Lifestyle & Behavioral factors:

Decreased physical activity, Sedentary lifestyle

Genetic & Biologic mechanisms:

Age, Gender, Body frame size, Medical conditions,
Rx medications

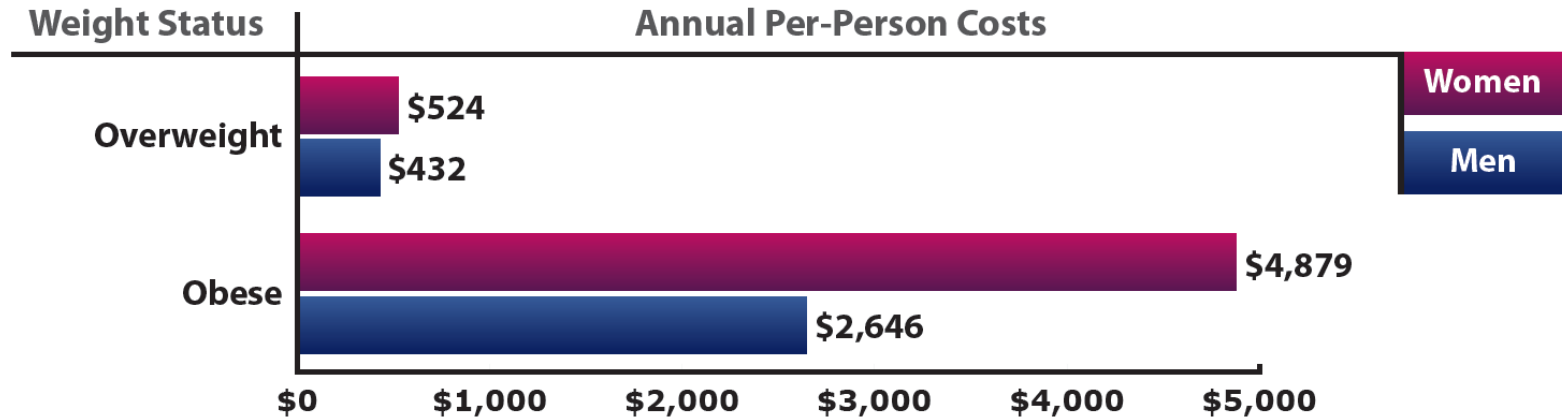
From Healthy People 2010



From Healthy People 2010

- ◆ Overweight and obesity are major contributors to many preventable causes of death (second only to tobacco).
- ◆ On average, higher body weights are associated with higher death rates.
- ◆ The number of overweight children, adolescents, and adults has risen over the past four decades.
- ◆ Total costs (medical cost and lost productivity) attributable to obesity alone amounted to an estimated \$99 billion in 1995.

Costs of Being Overweight & Obese



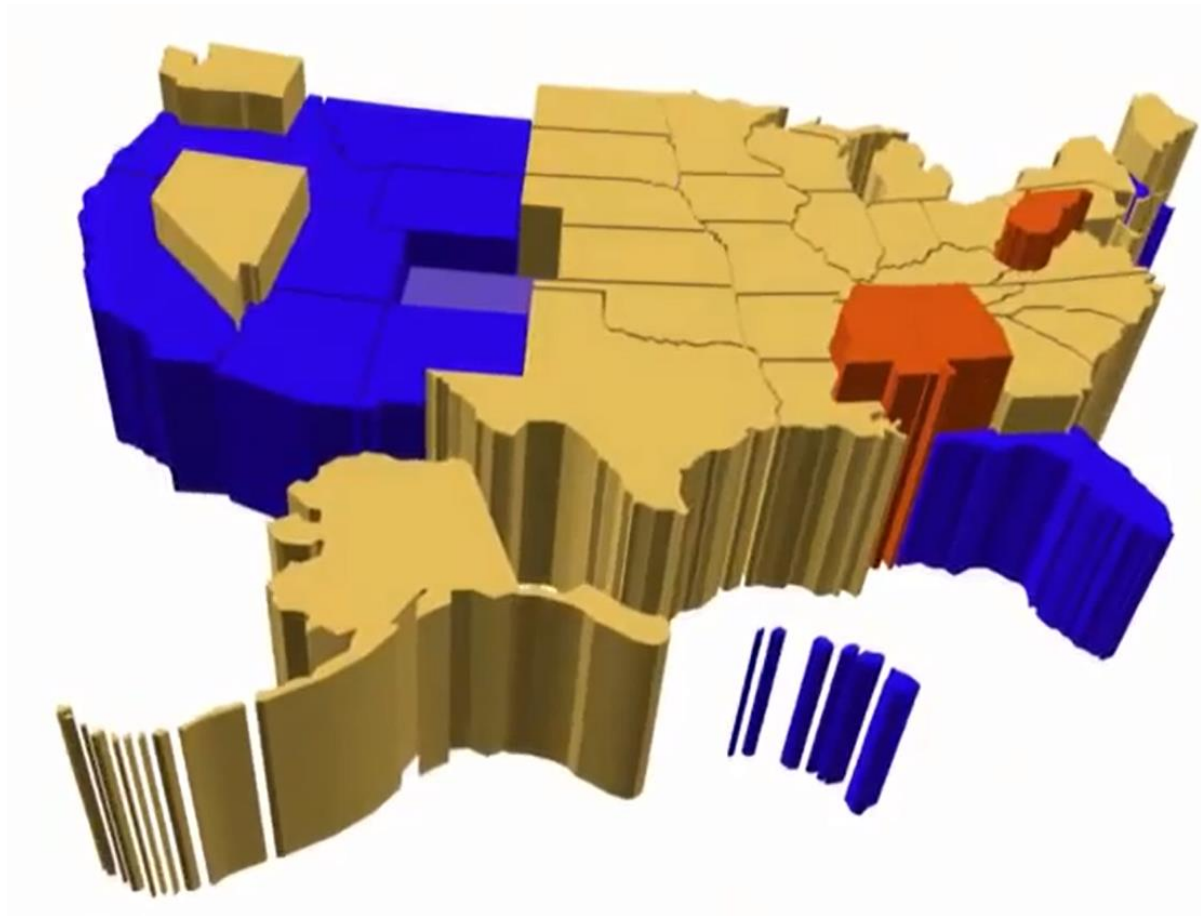
*When estimating costs, researchers evaluated such variables as direct medical costs, reduced work productivity, disability pension insurance, etc.

To fully understand the costs associated with obesity, it is important to capture not only direct medical costs, but also other types of costs associated with being overweight or obese, including lost wages, higher work-related costs, and higher costs associated with the purchase of personal goods.

From Healthy People 2010

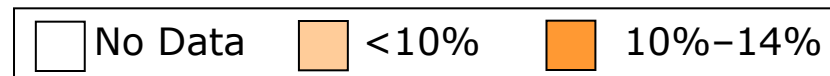
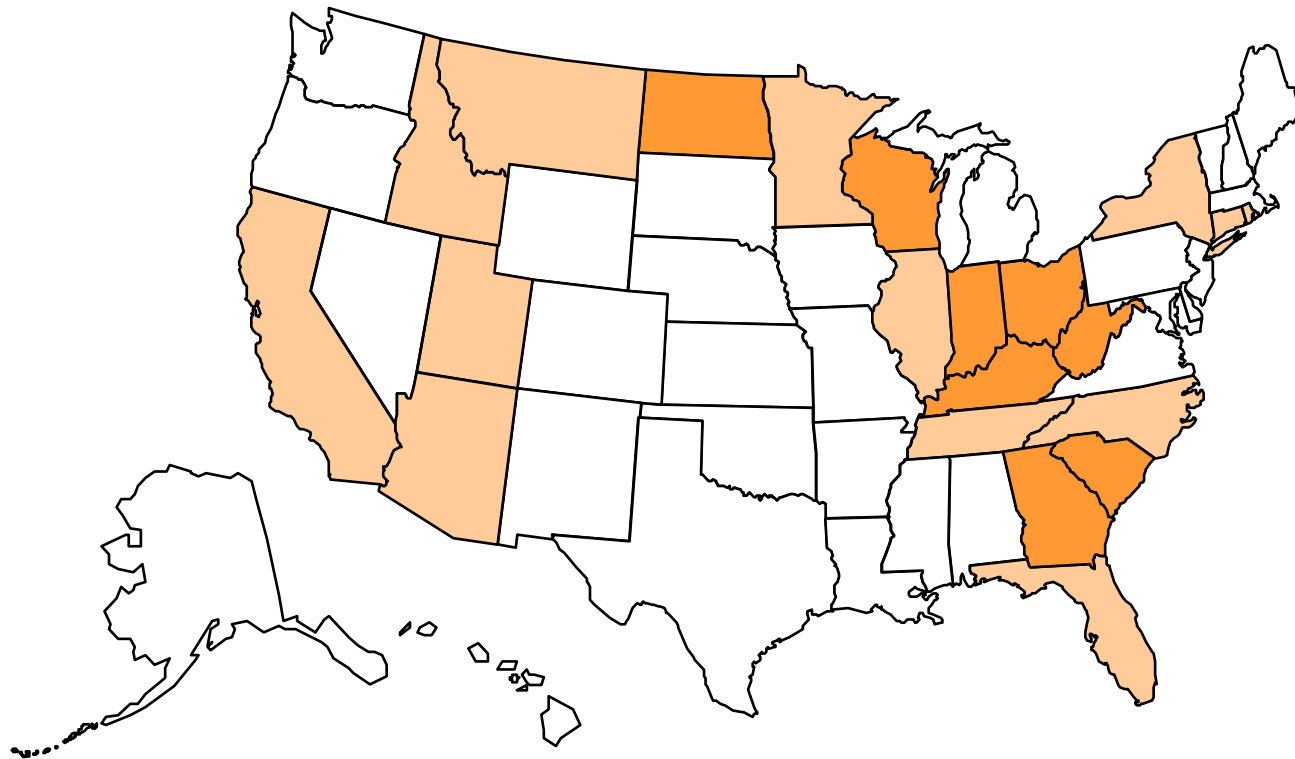
- ◆ Overweight and obesity substantially raise the risk of illness from high blood pressure, high cholesterol, type 2 diabetes, heart disease and stroke, gallbladder disease, arthritis, sleep disturbances and problems breathing.
- ◆ Approximately 30% of cancers are related to nutrition. However, it is estimated that a high intake of fruits and vegetables will cut that in half.

HBO – The Weight of the Nation



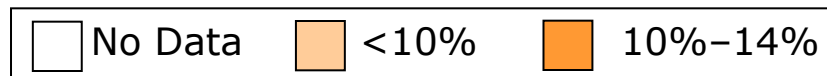
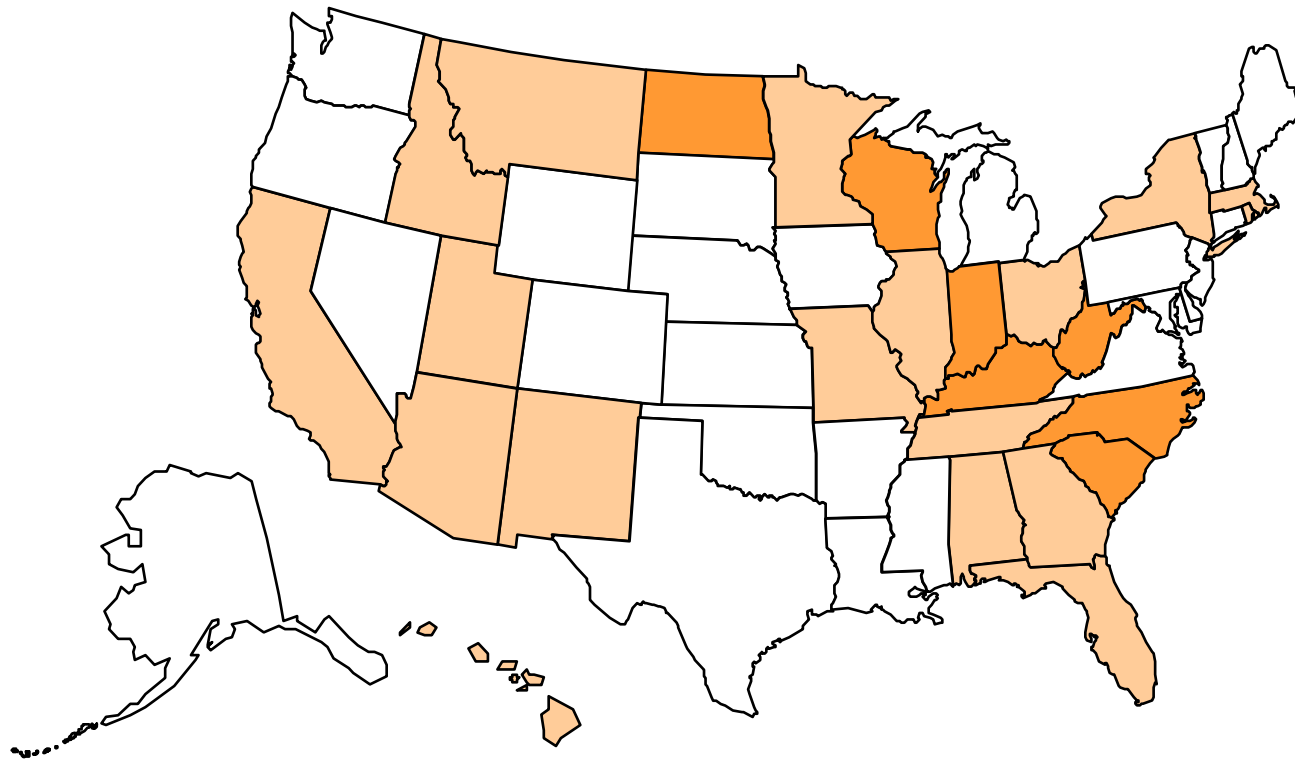
www.youtube.com/watch?v=0DLTpnnybuNs&hd=1

(*BMI ≥ 30 , or ~ 30 lbs overweight for 5' 4" person)



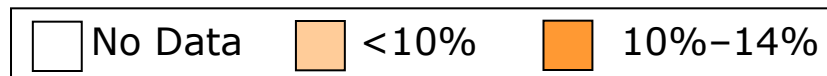
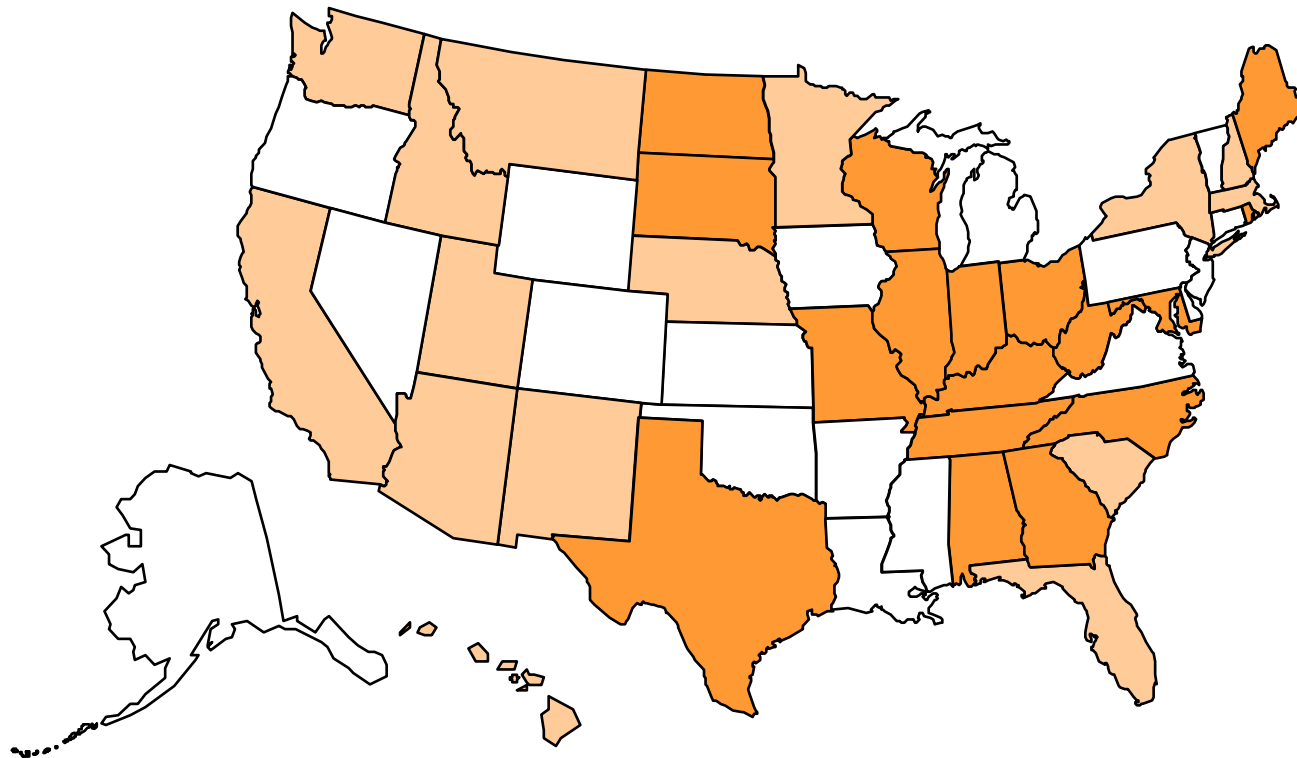
Obesity Trends* Among U.S. Adults – BRFSS, 1986

(*BMI ≥ 30 , or ~ 30 lbs overweight for 5' 4" person)



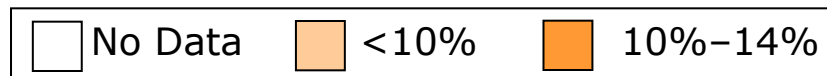
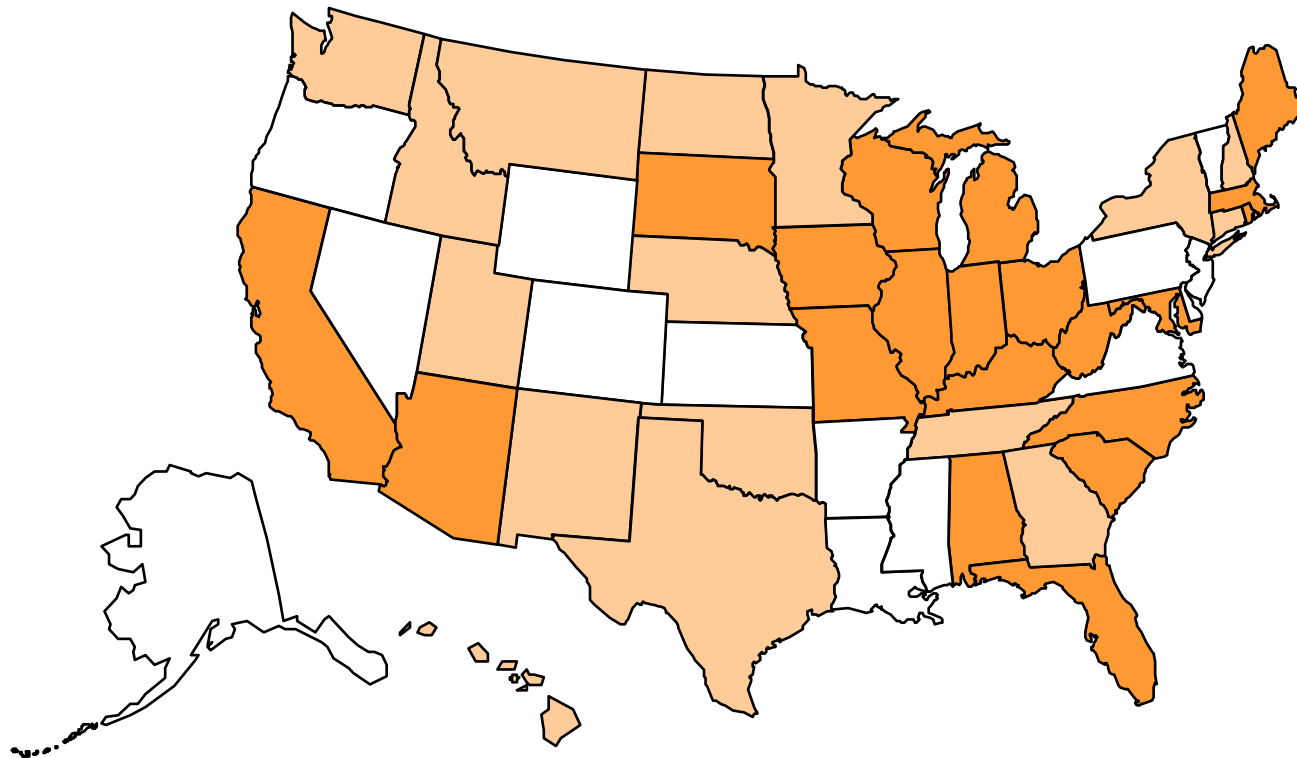
Obesity Trends* Among U.S. Adults – BRFSS, 1987

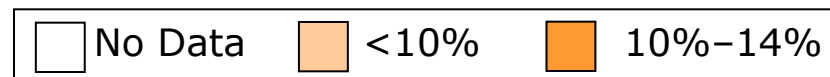
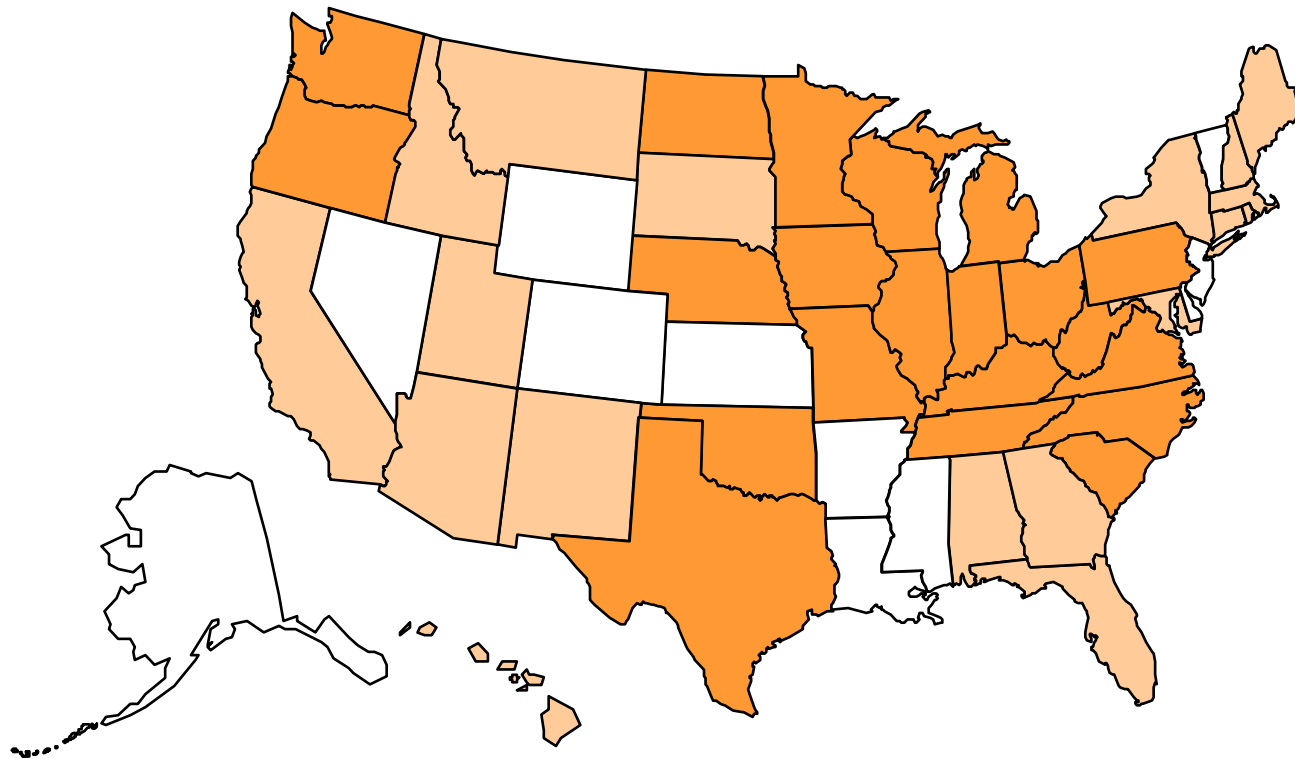
(*BMI ≥ 30 , or ~ 30 lbs overweight for 5' 4" person)



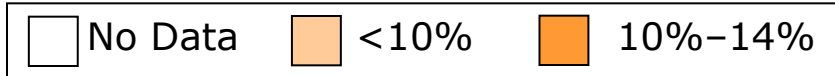
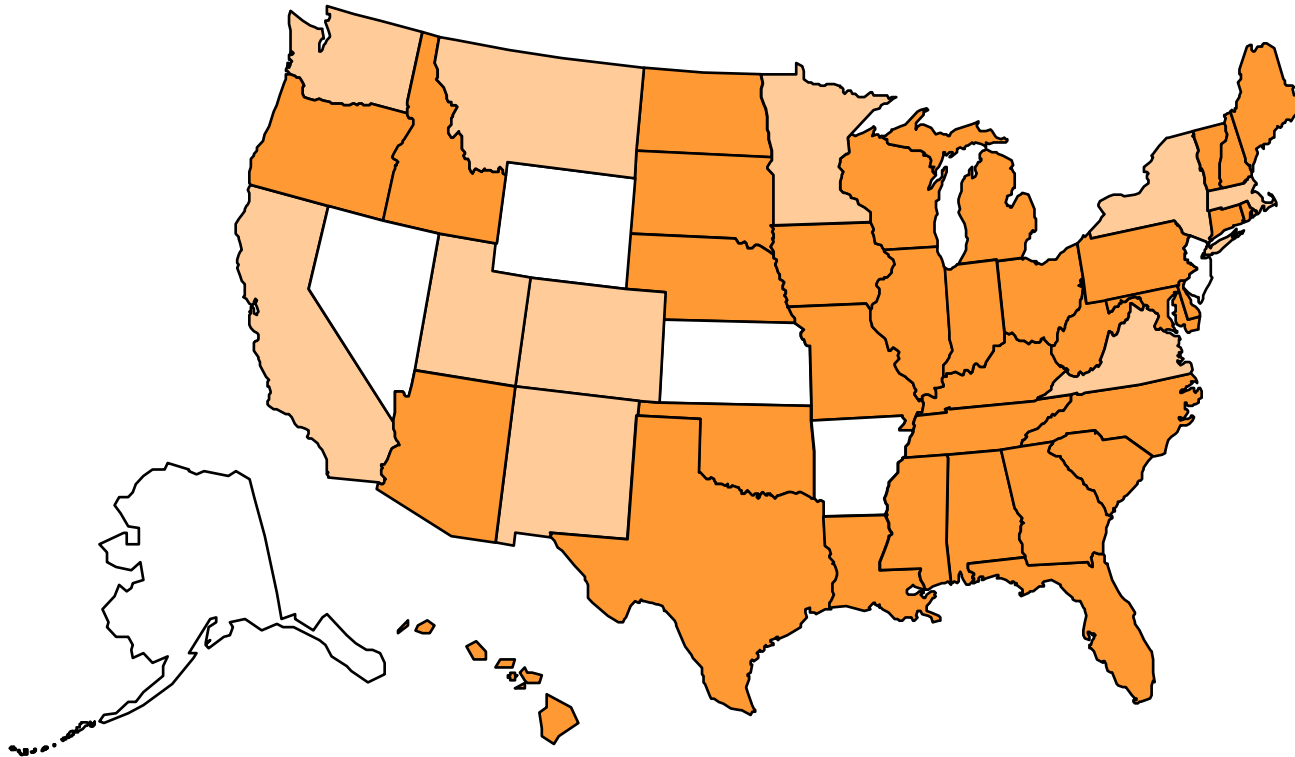
Obesity Trends* Among U.S. Adults – BRFSS, 1988

(*BMI ≥ 30 , or ~ 30 lbs overweight for 5' 4" person)



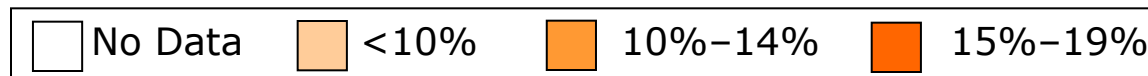
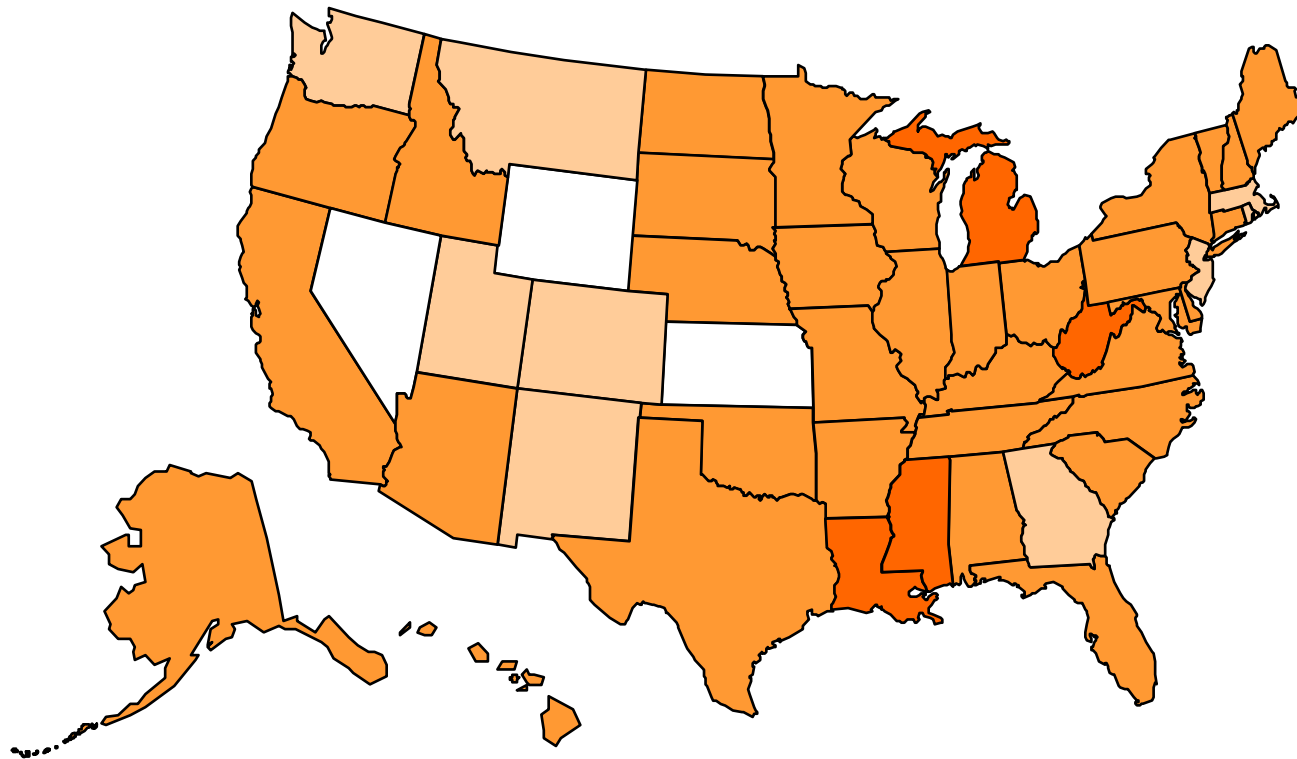
(*BMI ≥ 30 , or ~ 30 lbs overweight for 5' 4" person)

Obesity Trends* Among U.S. Adults – BRFSS, 1990 (*BMI ≥ 30 , or ~ 30 lbs overweight for 5' 4" person)



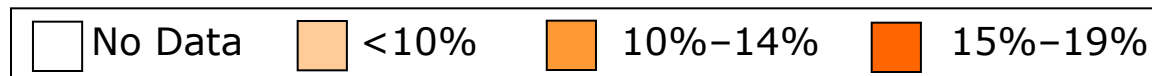
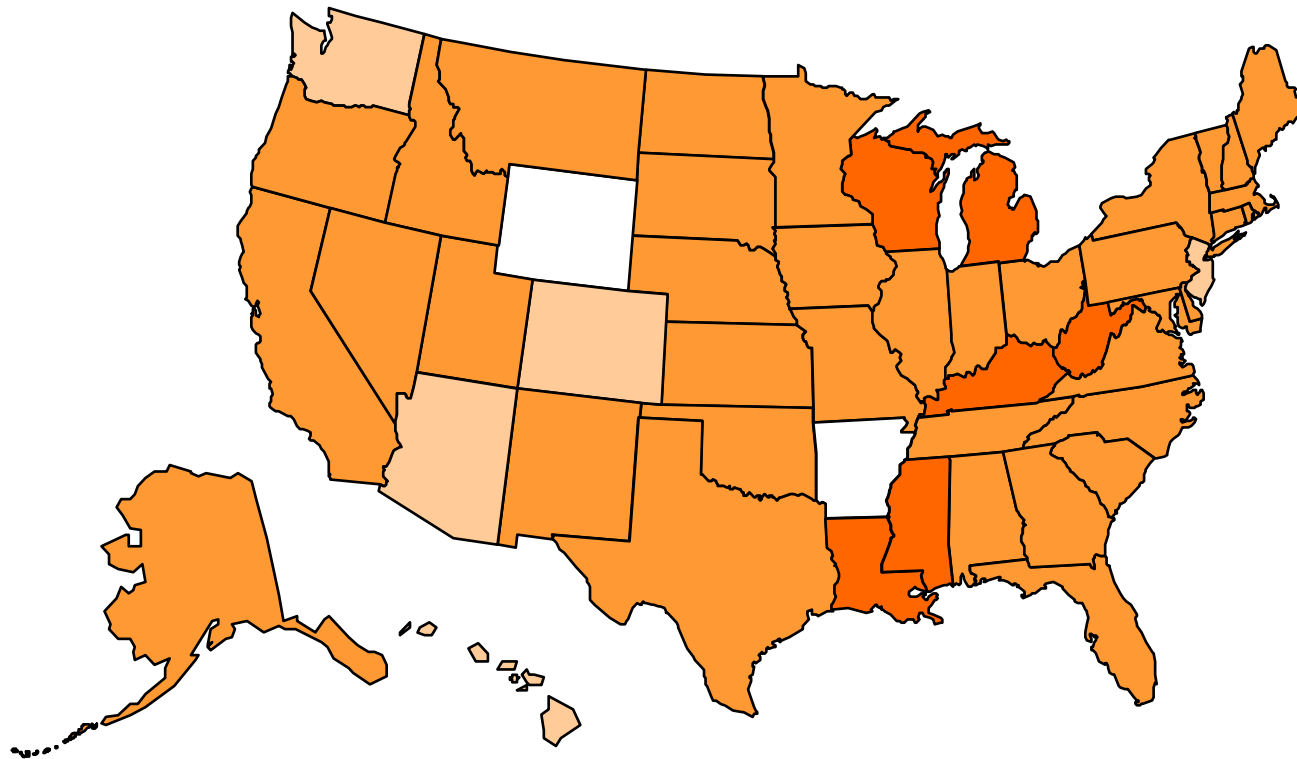
Obesity Trends* Among U.S. Adults – BRFSS, 1991

(*BMI ≥ 30 , or ~ 30 lbs overweight for 5' 4" person)



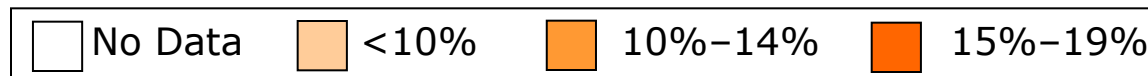
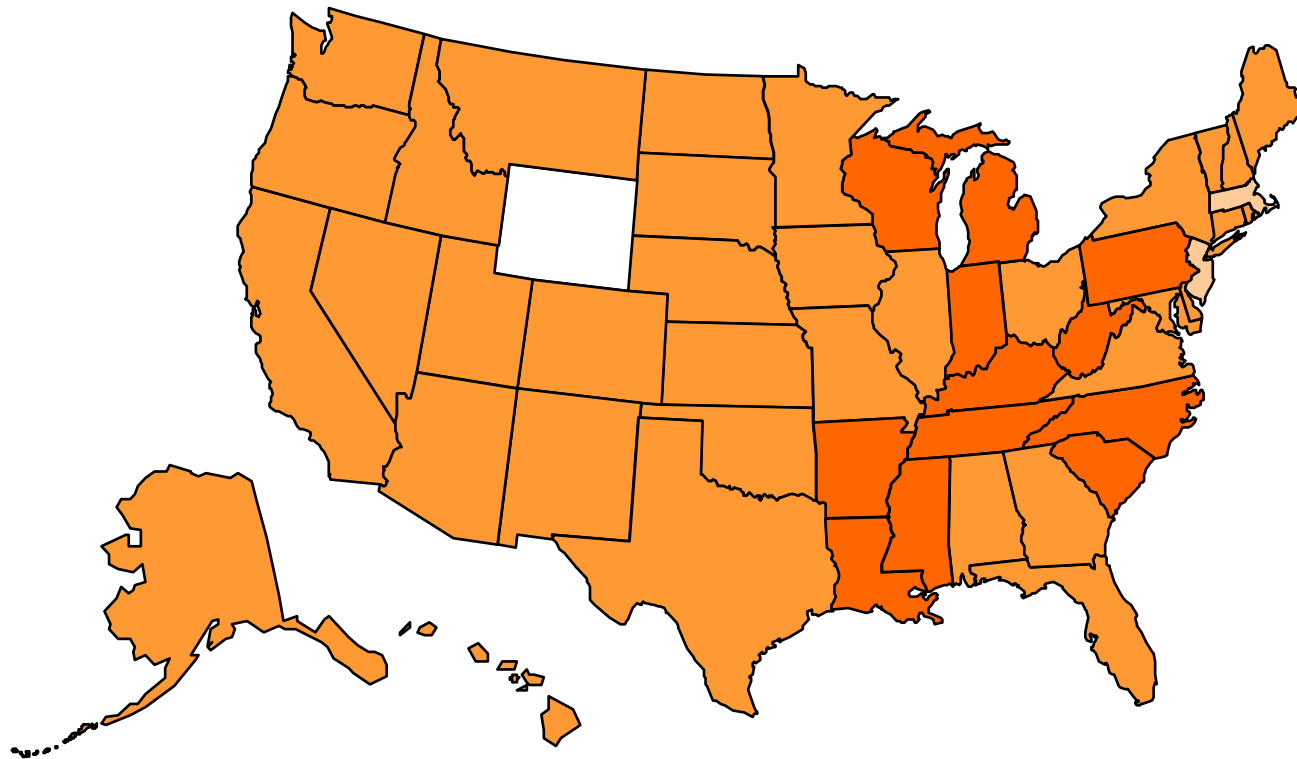
Obesity Trends* Among U.S. Adults – BRFSS, 1992

(*BMI ≥ 30 , or ~ 30 lbs overweight for 5' 4" person)



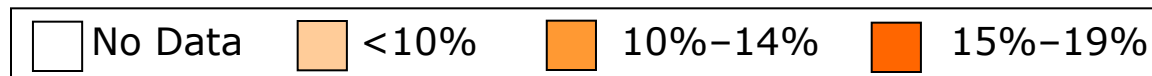
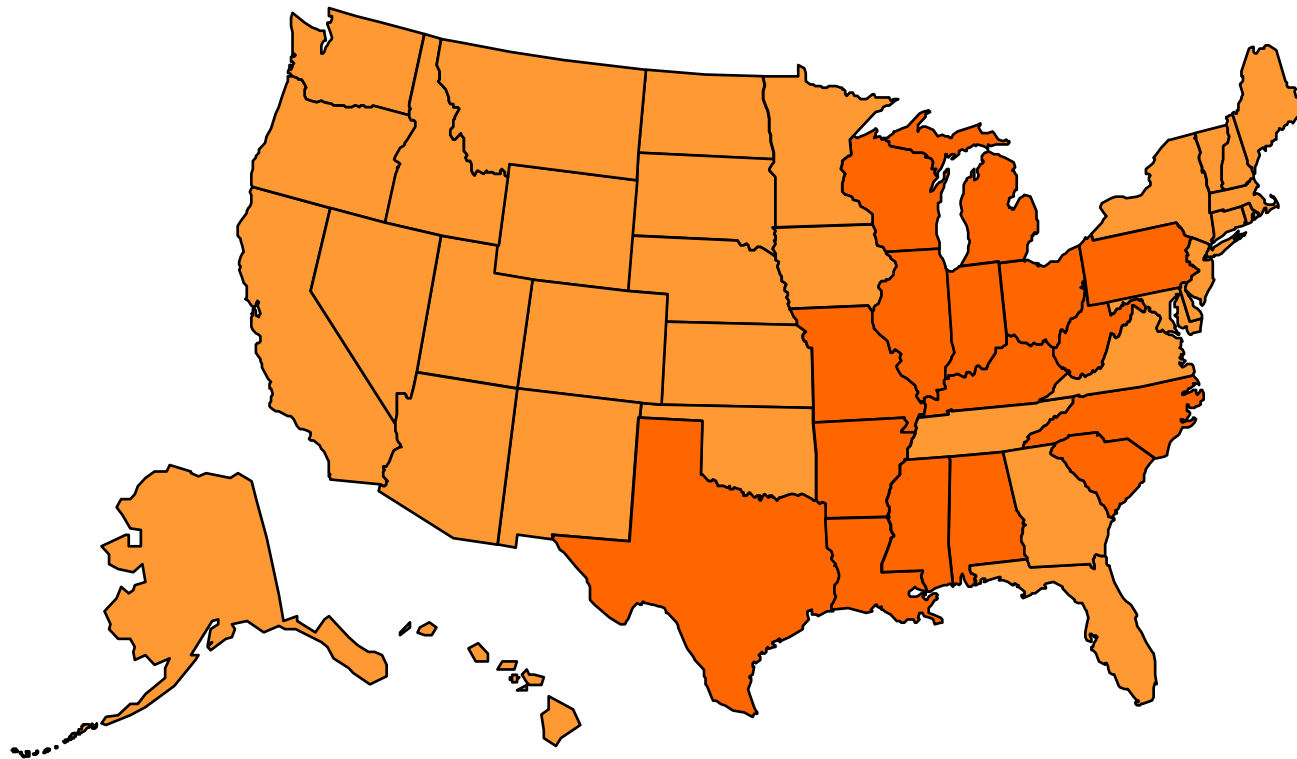
Obesity Trends* Among U.S. Adults – BRFSS, 1993

(*BMI ≥ 30 , or ~ 30 lbs overweight for 5' 4" person)

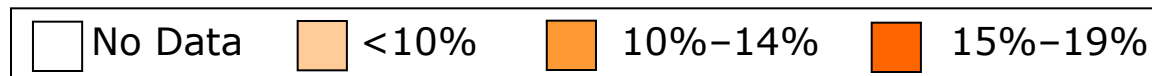
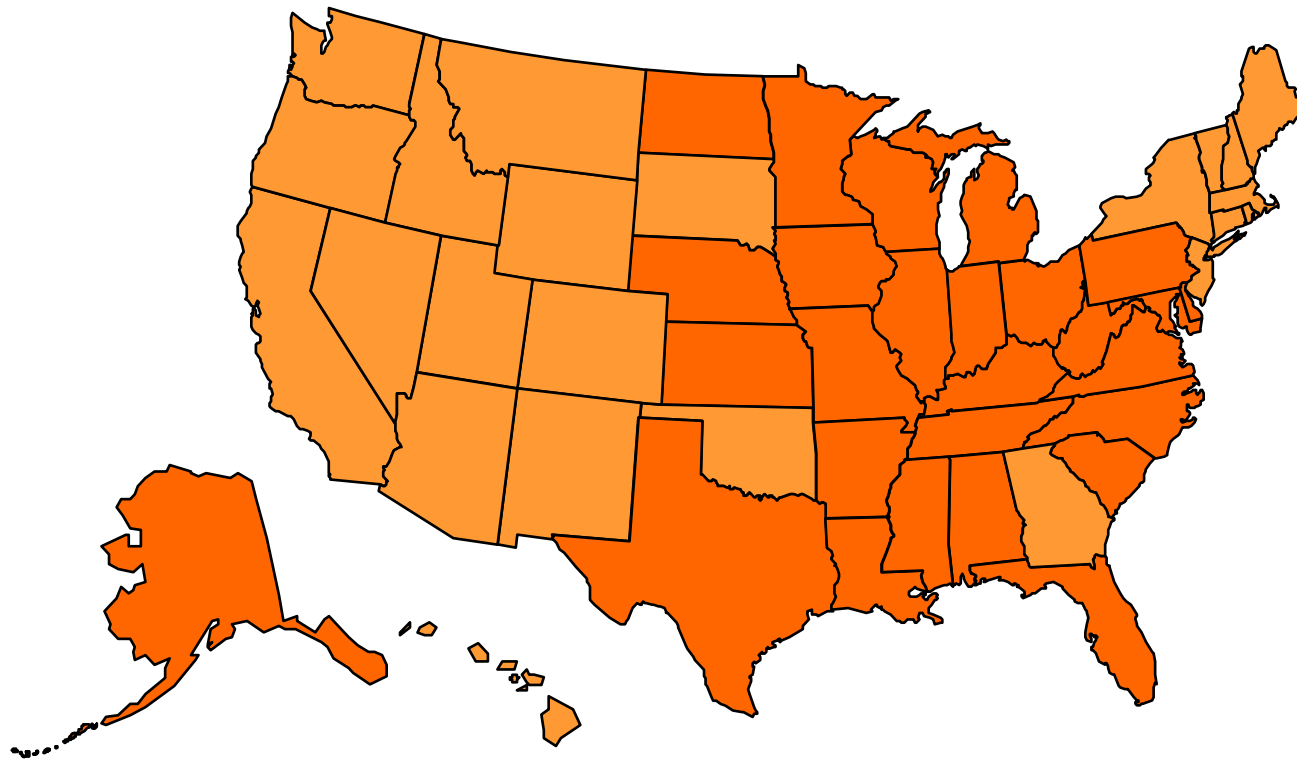


Obesity Trends* Among U.S. Adults – BRFSS, 1994

(*BMI ≥ 30 , or ~ 30 lbs overweight for 5' 4" person)

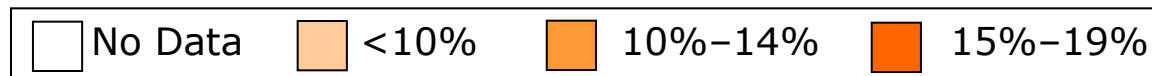
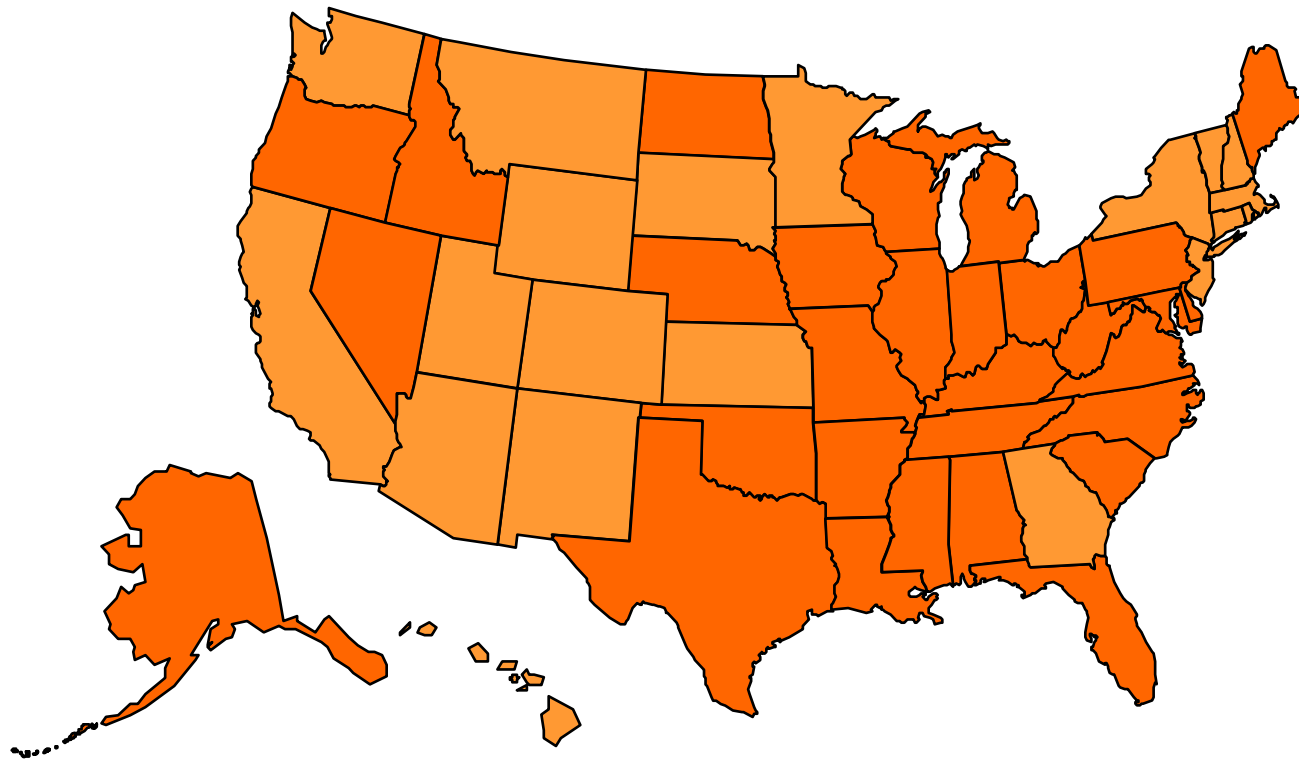


Obesity Trends* Among U.S. Adults – BRFSS, 1995

(*BMI ≥ 30 , or ~ 30 lbs overweight for 5' 4" person)

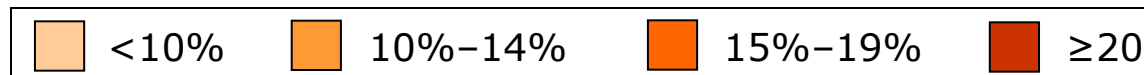
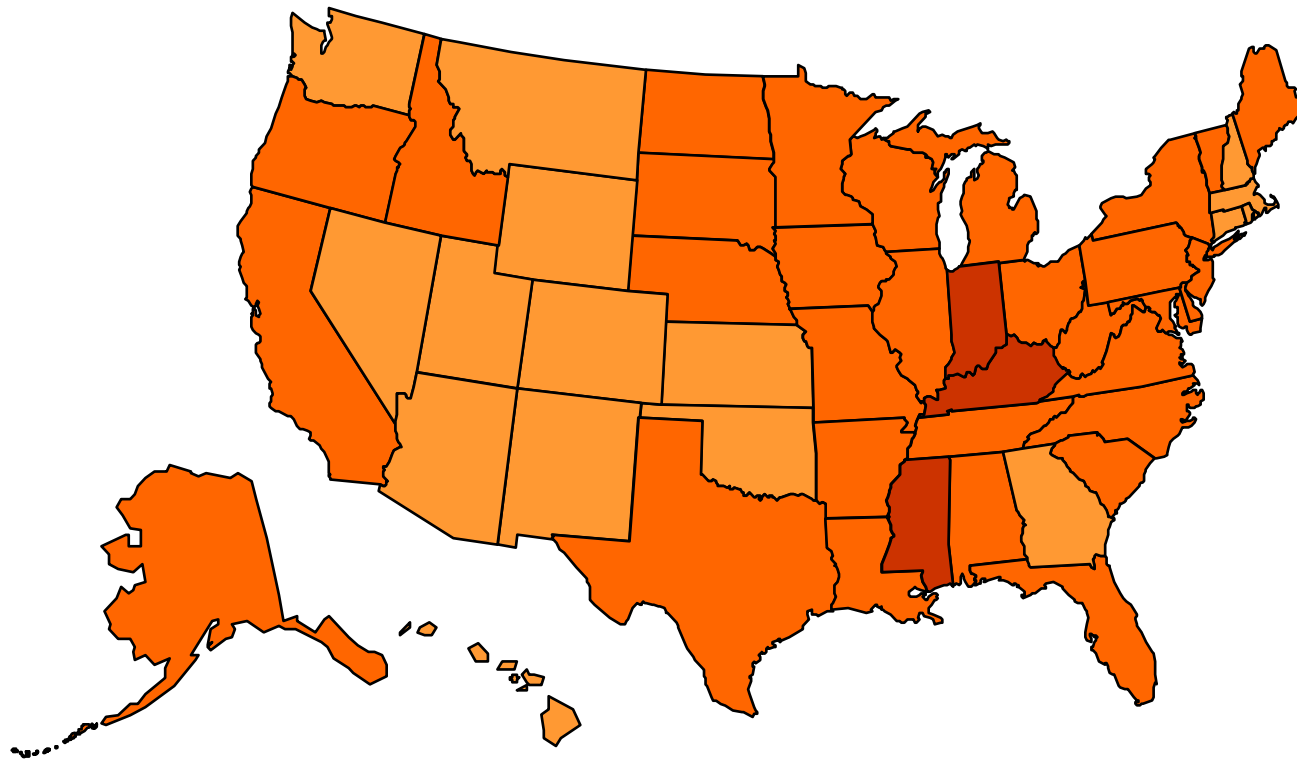
Obesity Trends* Among U.S. Adults – BRFSS, 1996

(*BMI ≥ 30 , or ~ 30 lbs overweight for 5' 4" person)



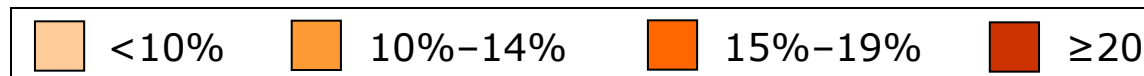
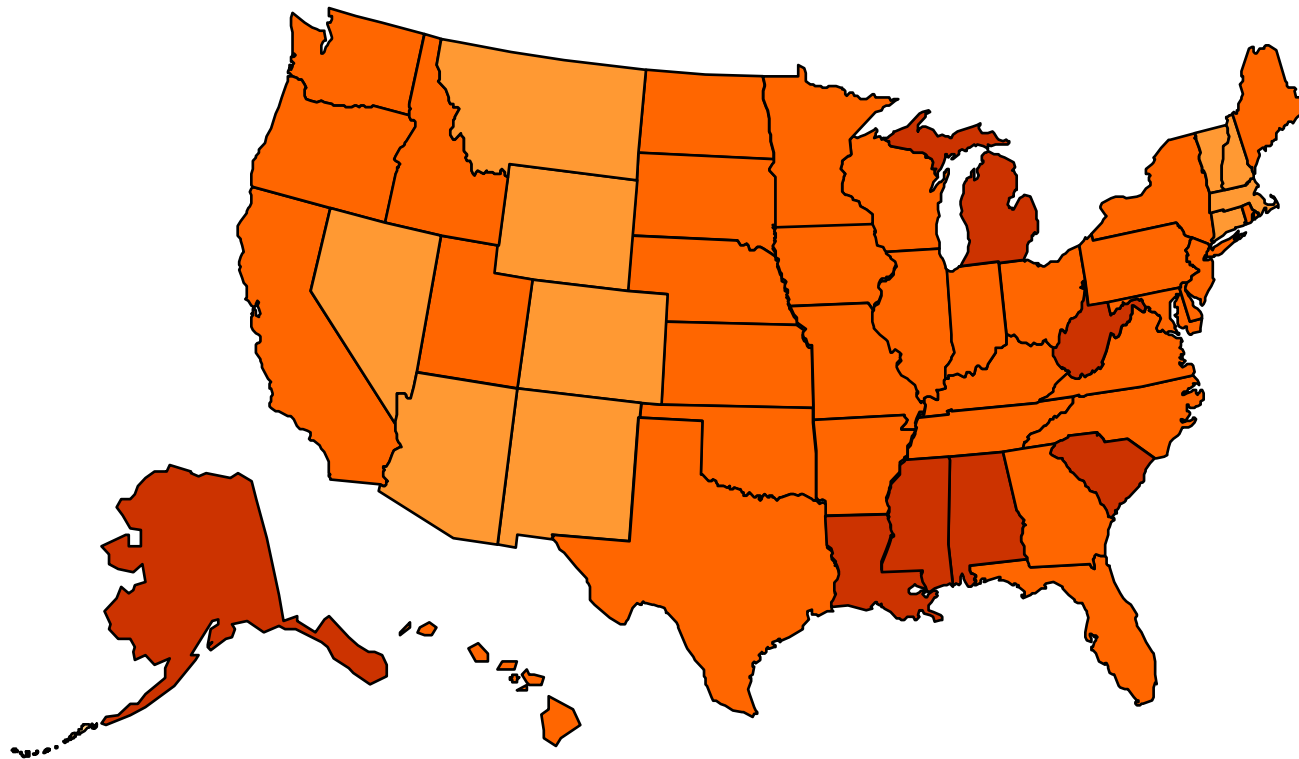
Obesity Trends* Among U.S. Adults – BRFSS, 1997

(*BMI ≥ 30 , or ~ 30 lbs overweight for 5' 4" person)



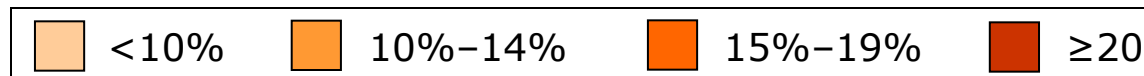
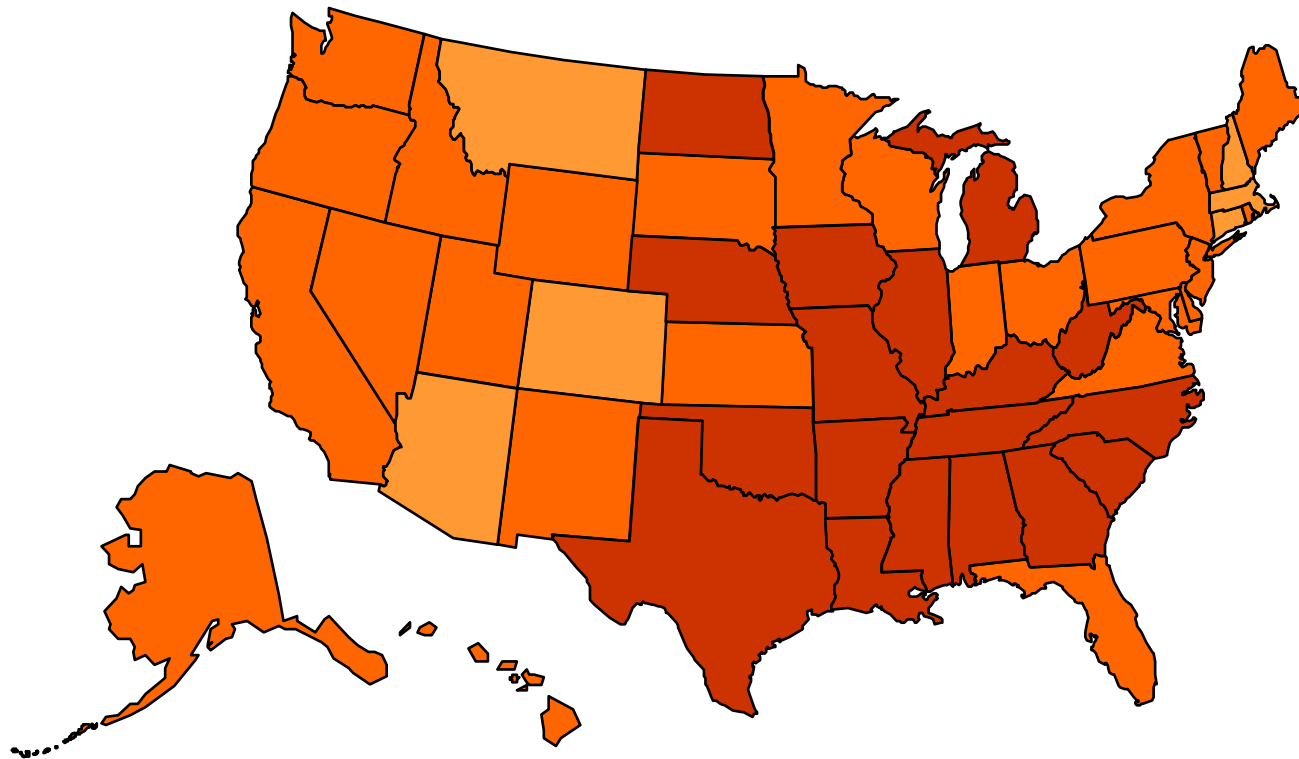
Obesity Trends* Among U.S. Adults – BRFSS, 1998

(*BMI ≥ 30 , or ~ 30 lbs overweight for 5' 4" person)



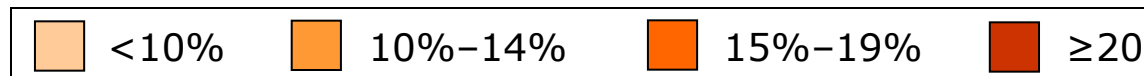
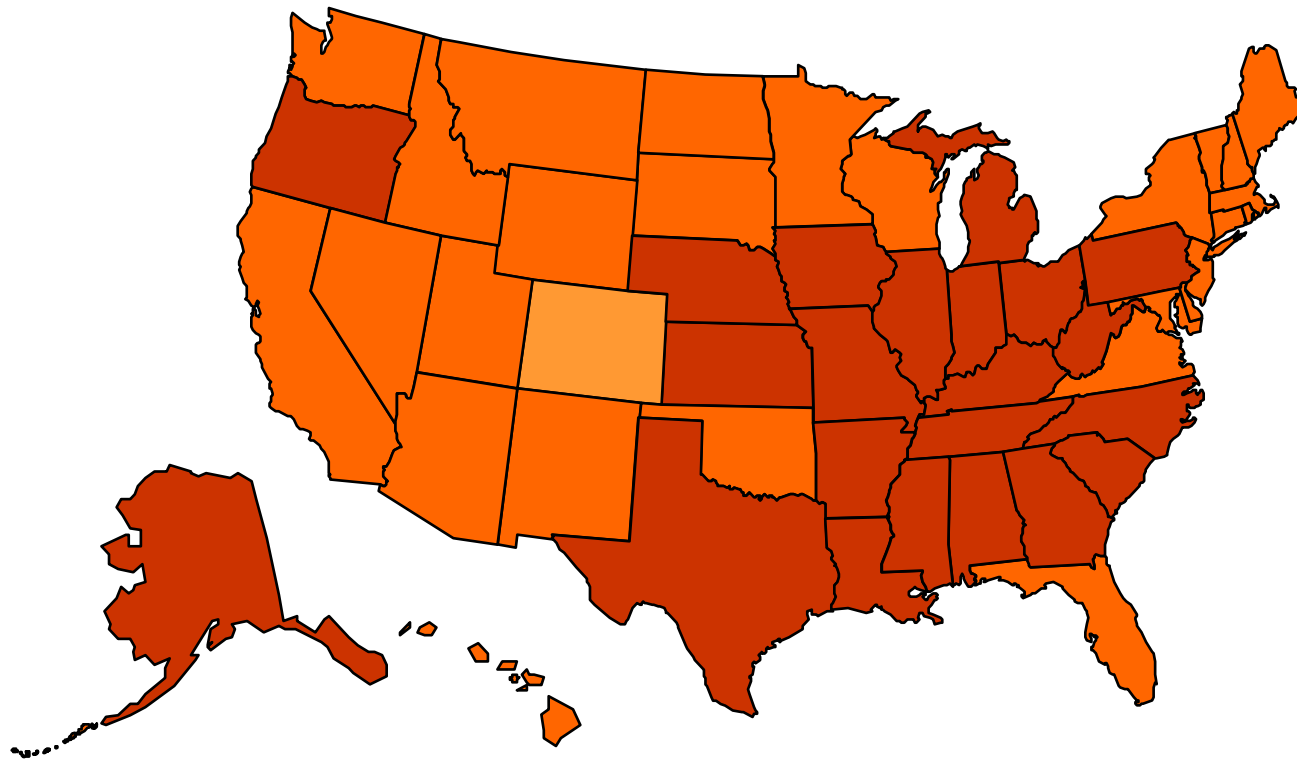
Obesity Trends* Among U.S. Adults – BRFSS, 1999

(*BMI ≥ 30 , or ~ 30 lbs overweight for 5' 4" person)



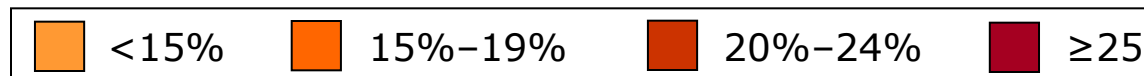
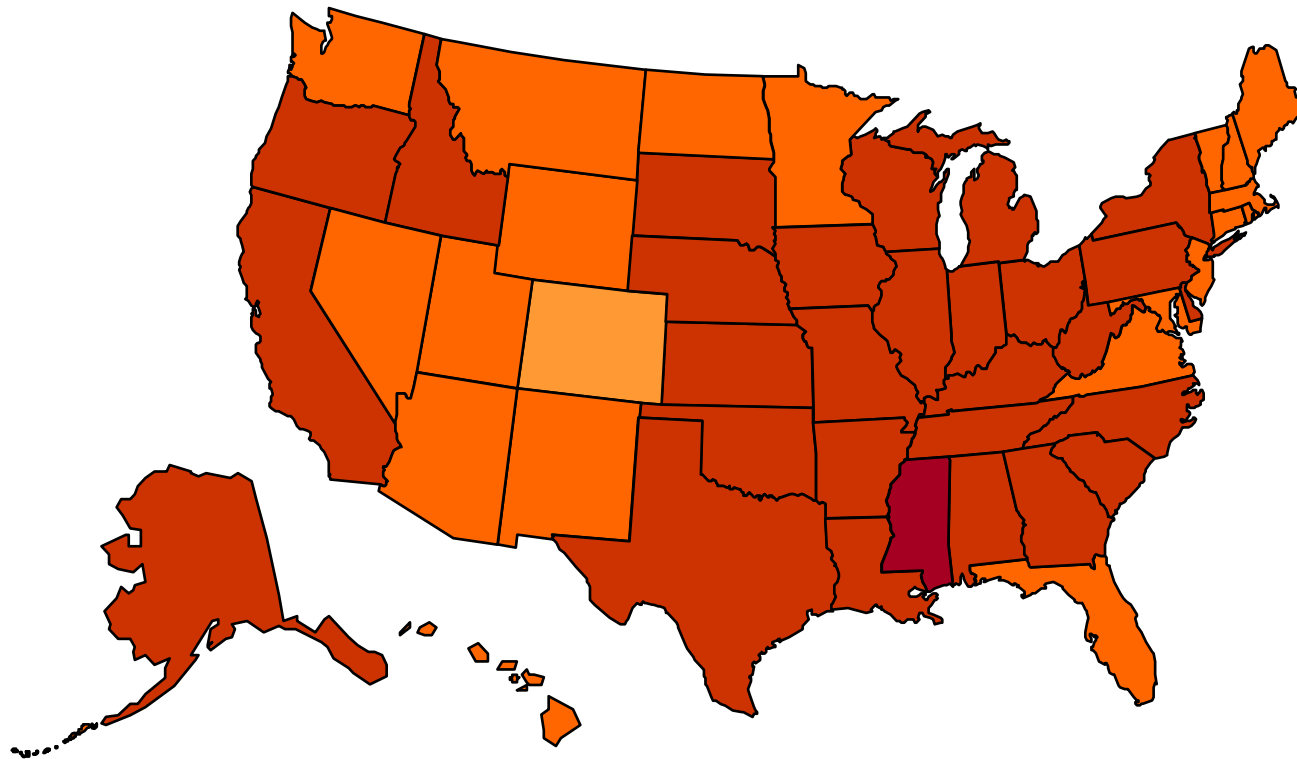
Obesity Trends* Among U.S. Adults – BRFSS, 2000

(*BMI ≥ 30 , or ~ 30 lbs overweight for 5' 4" person)



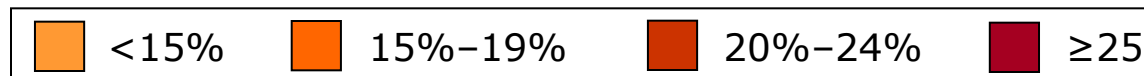
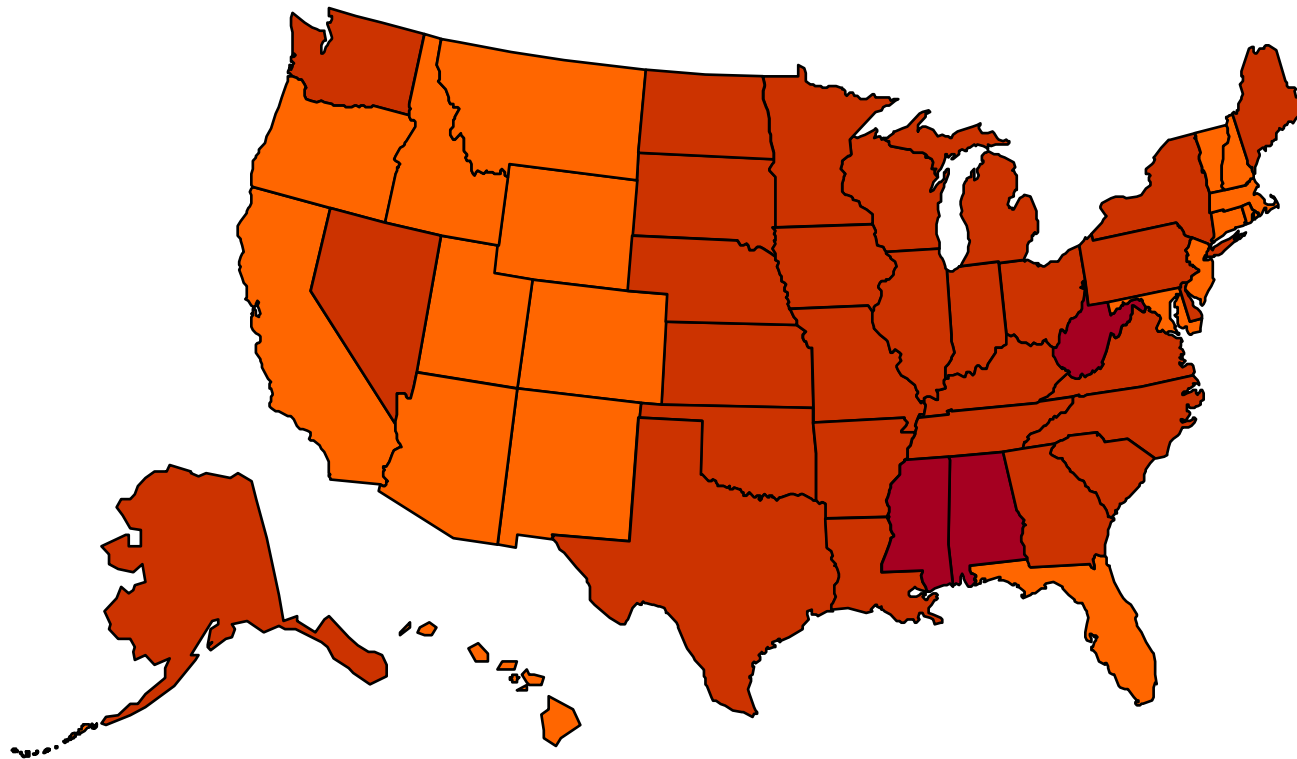
Obesity Trends* Among U.S. Adults – BRFSS, 2001

(*BMI ≥ 30 , or ~ 30 lbs overweight for 5' 4" person)



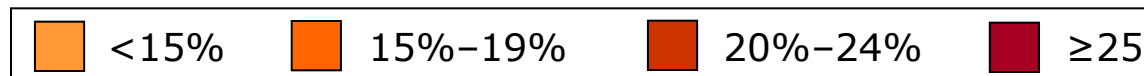
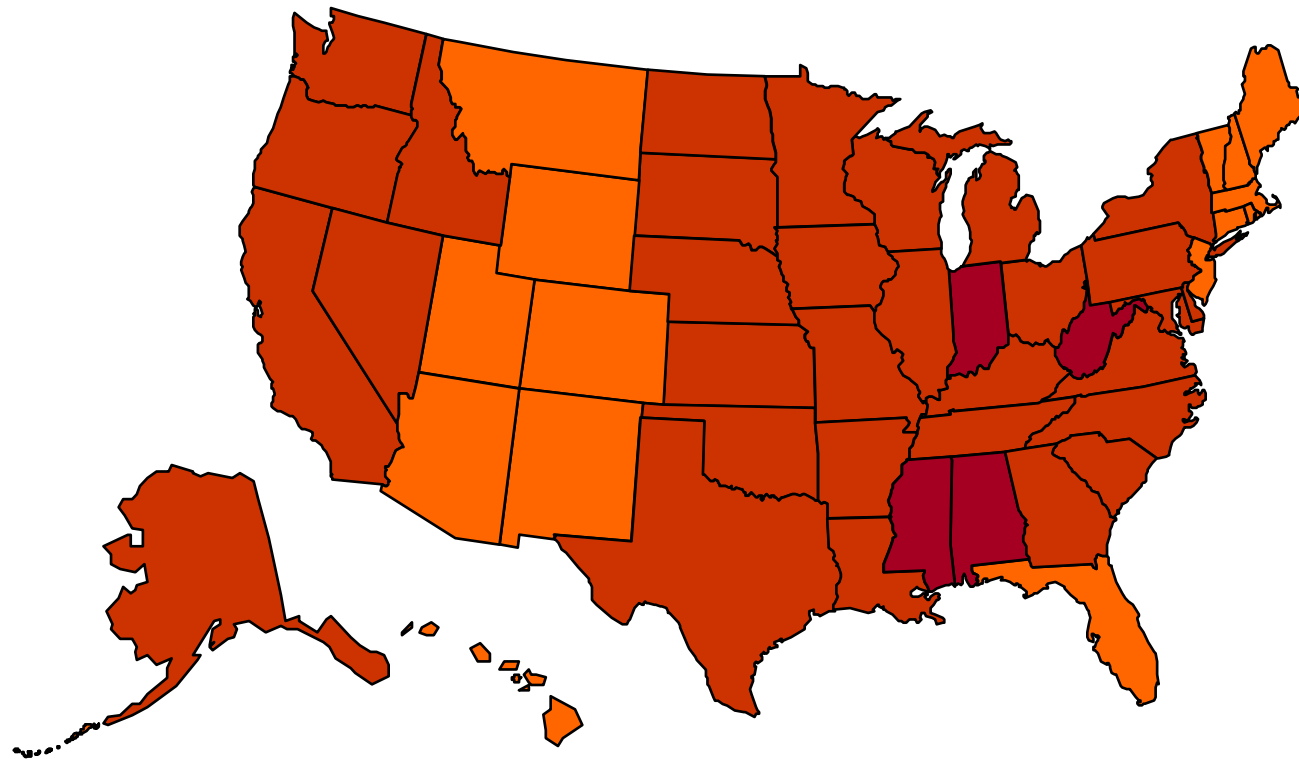
Obesity Trends* Among U.S. Adults – BRFSS, 2002

(*BMI ≥ 30 , or ~ 30 lbs overweight for 5' 4" person)



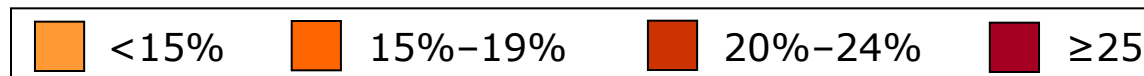
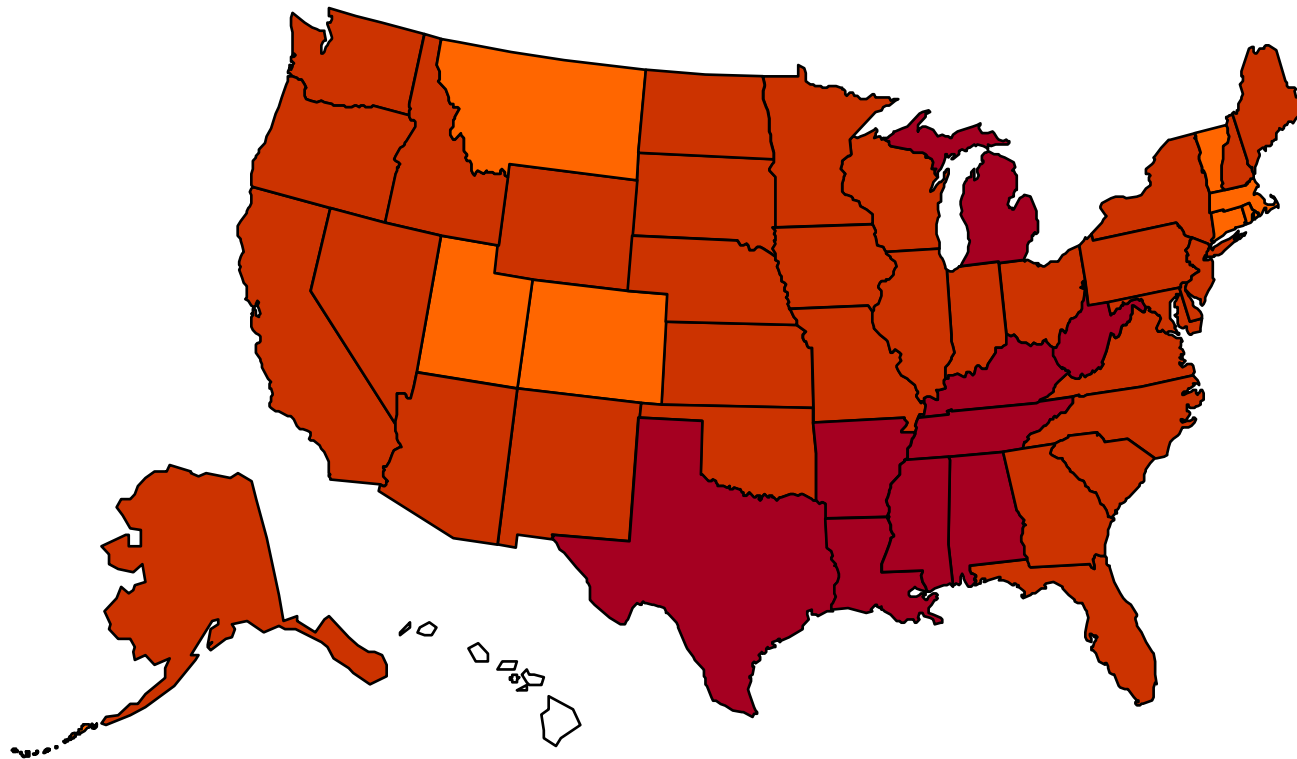
Obesity Trends* Among U.S. Adults – BRFSS, 2003

(*BMI ≥ 30 , or ~ 30 lbs overweight for 5' 4" person)



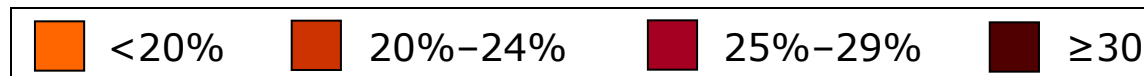
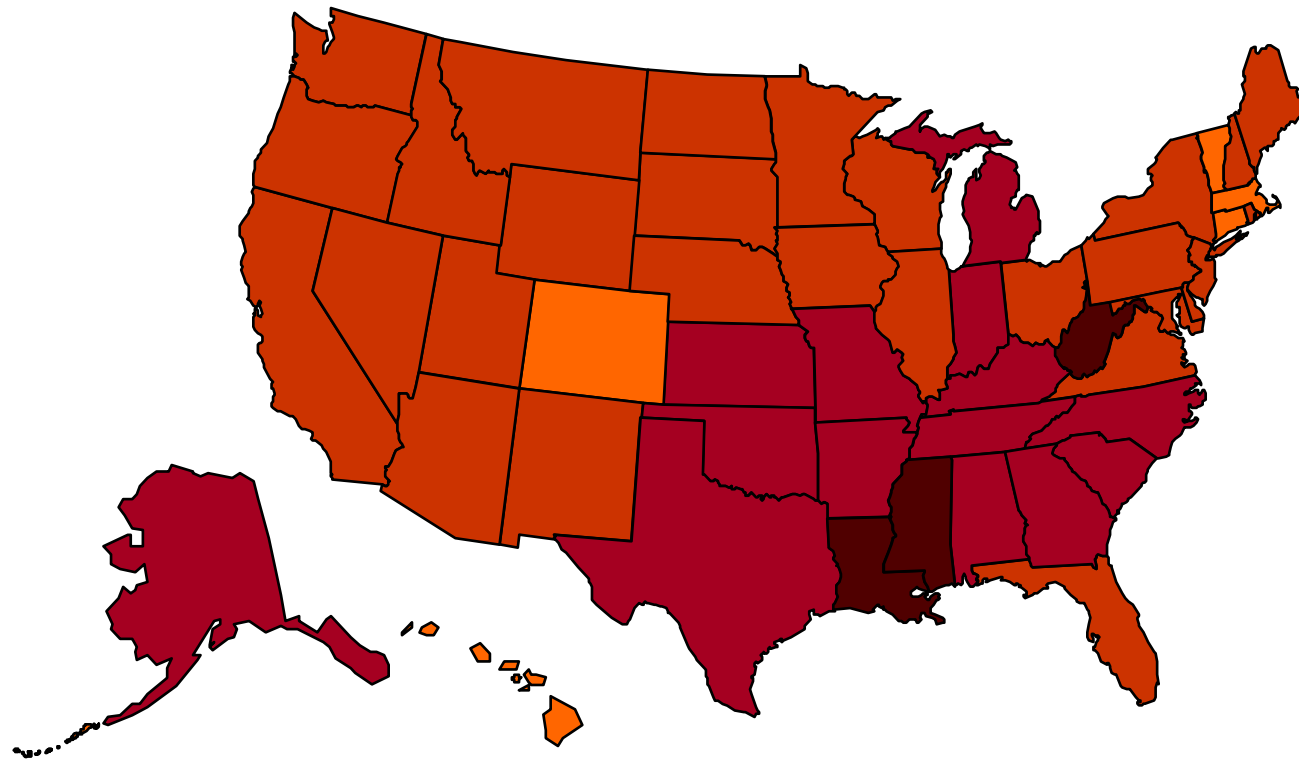
Obesity Trends* Among U.S. Adults – BRFSS, 2004

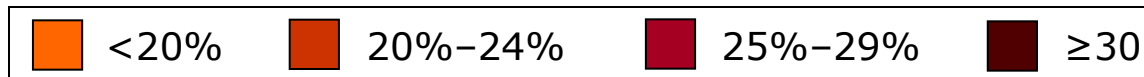
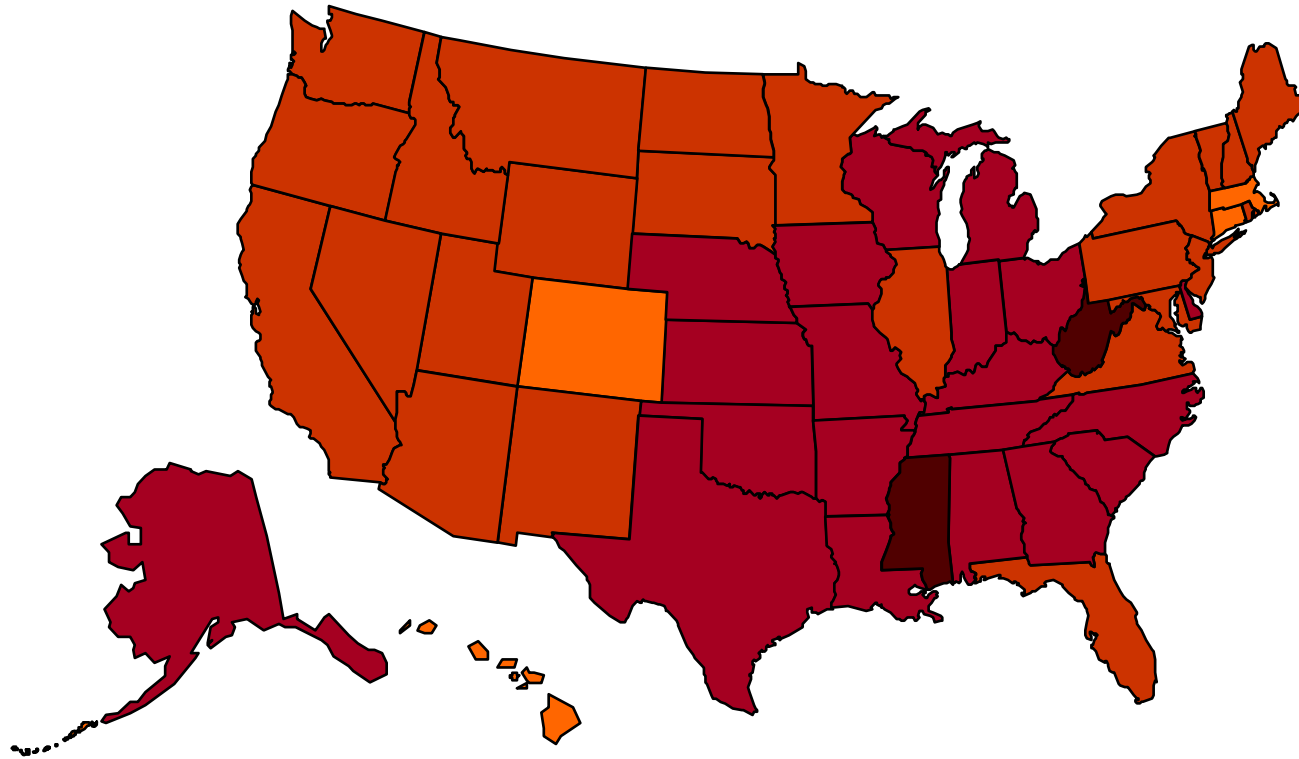
(*BMI ≥ 30 , or ~ 30 lbs overweight for 5' 4" person)



Obesity Trends* Among U.S. Adults – BRFSS, 2005

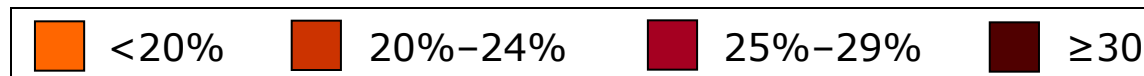
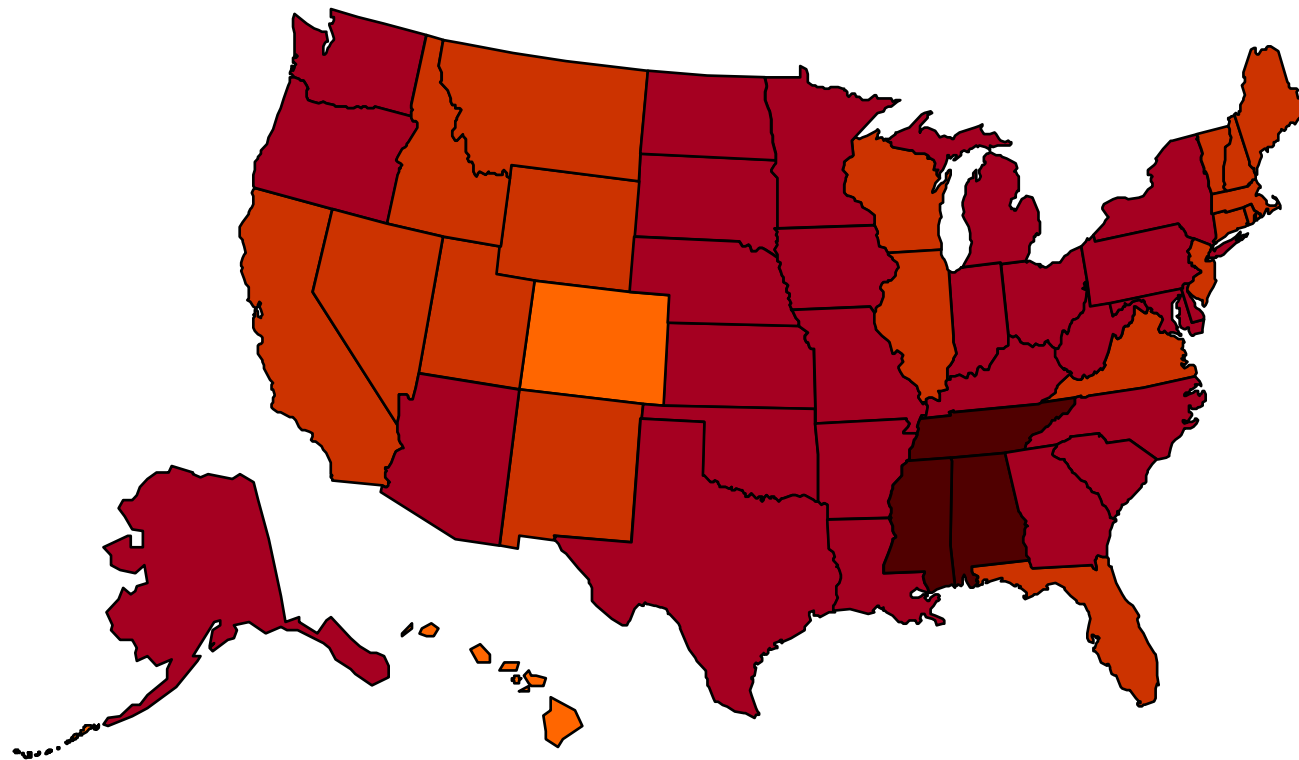
(*BMI ≥ 30 , or ~ 30 lbs overweight for 5' 4" person)

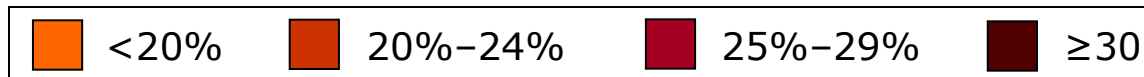
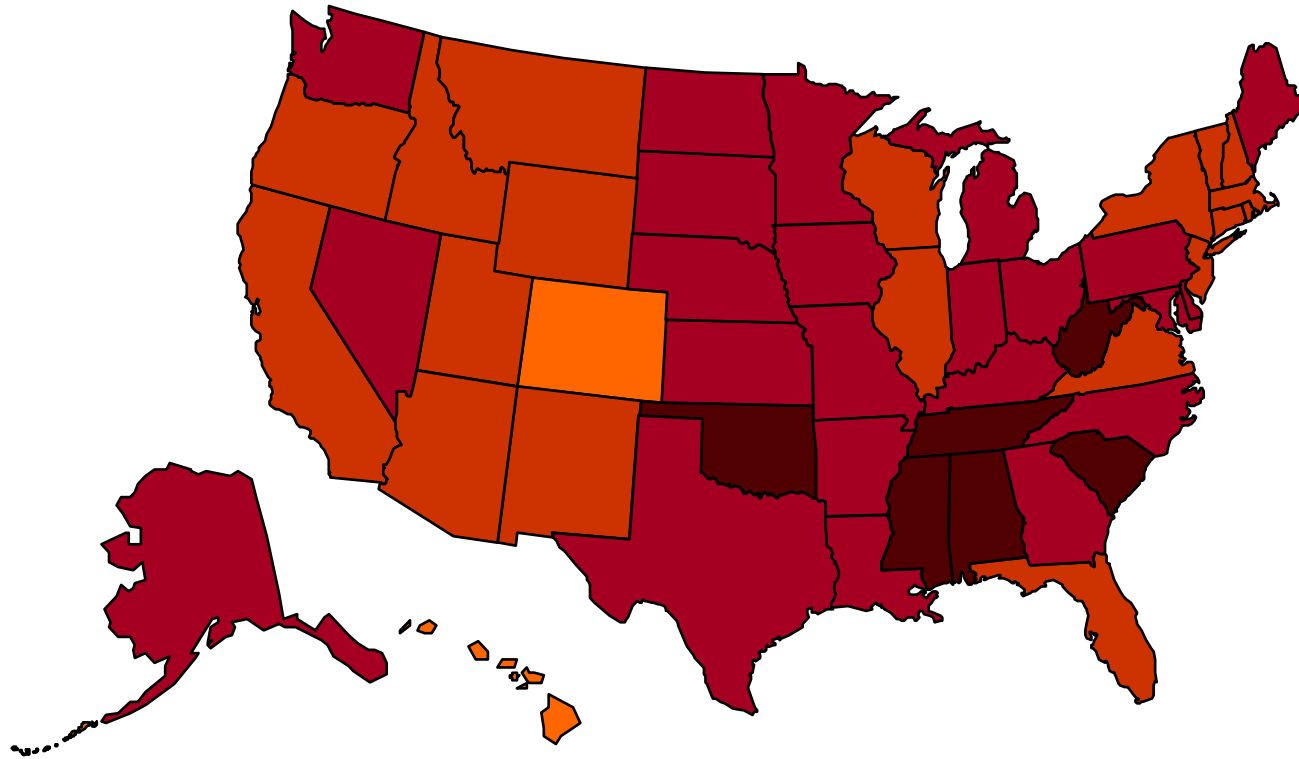


(*BMI ≥ 30 , or ~ 30 lbs overweight for 5' 4" person)

Obesity Trends* Among U.S. Adults – BRFSS, 2007

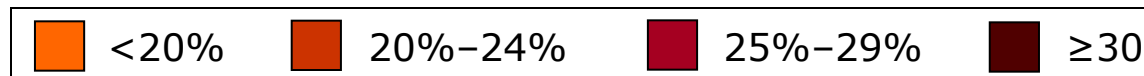
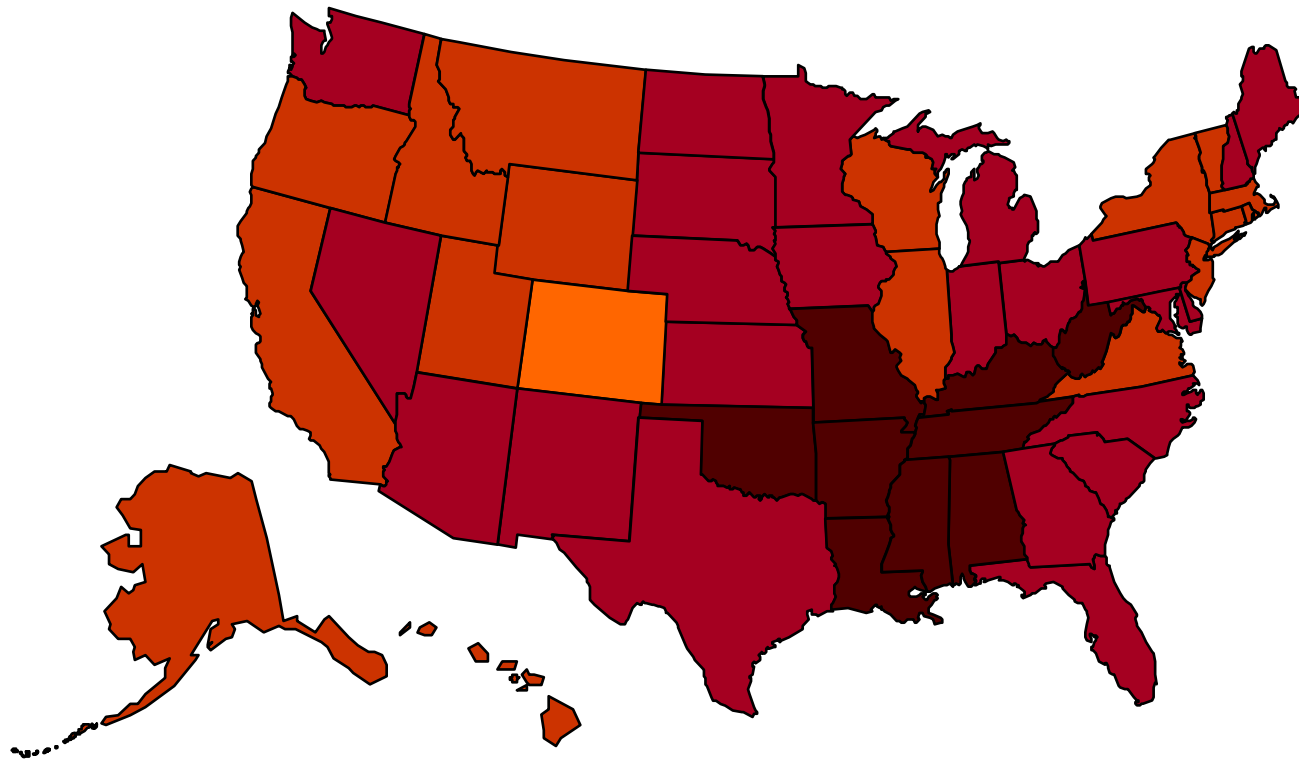
(*BMI ≥ 30 , or ~ 30 lbs overweight for 5' 4" person)



(*BMI ≥ 30 , or ~ 30 lbs overweight for 5' 4" person)

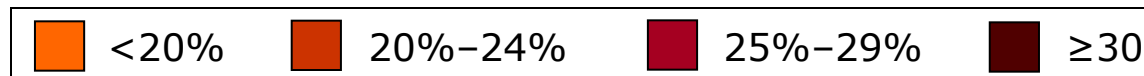
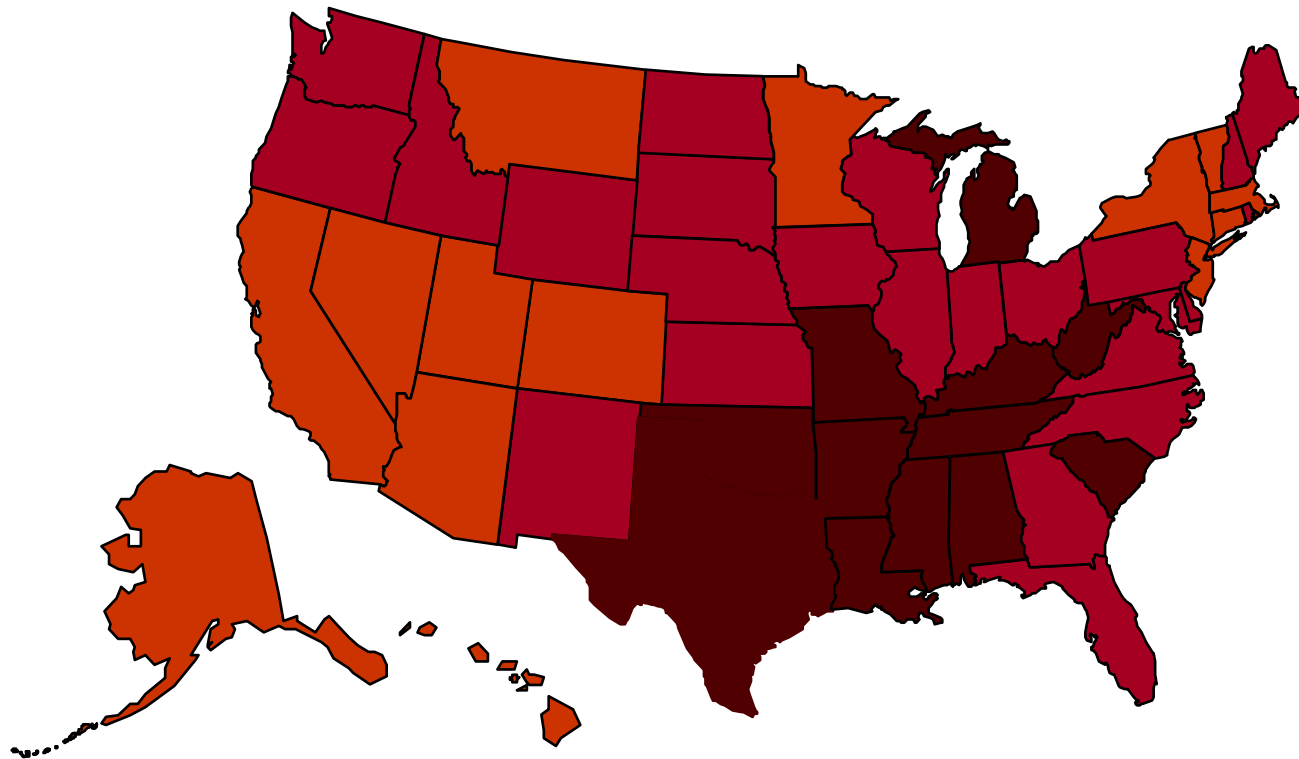
Obesity Trends* Among U.S. Adults – BRFSS, 2009

(*BMI ≥ 30 , or ~ 30 lbs overweight for 5' 4" person)

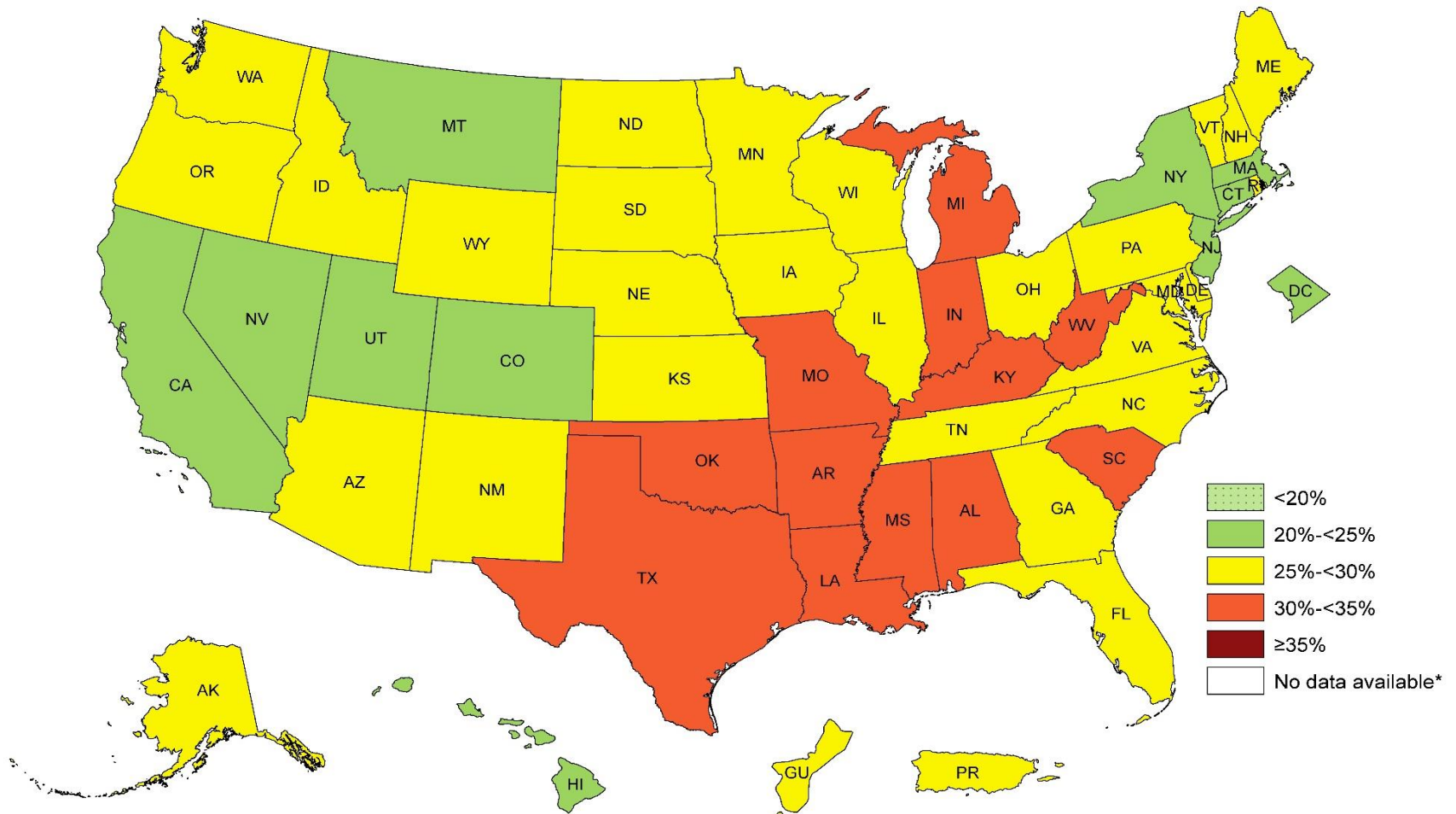


Obesity Trends* Among U.S. Adults – BRFSS, 2010

(*BMI ≥ 30 , or ~ 30 lbs overweight for 5' 4" person)



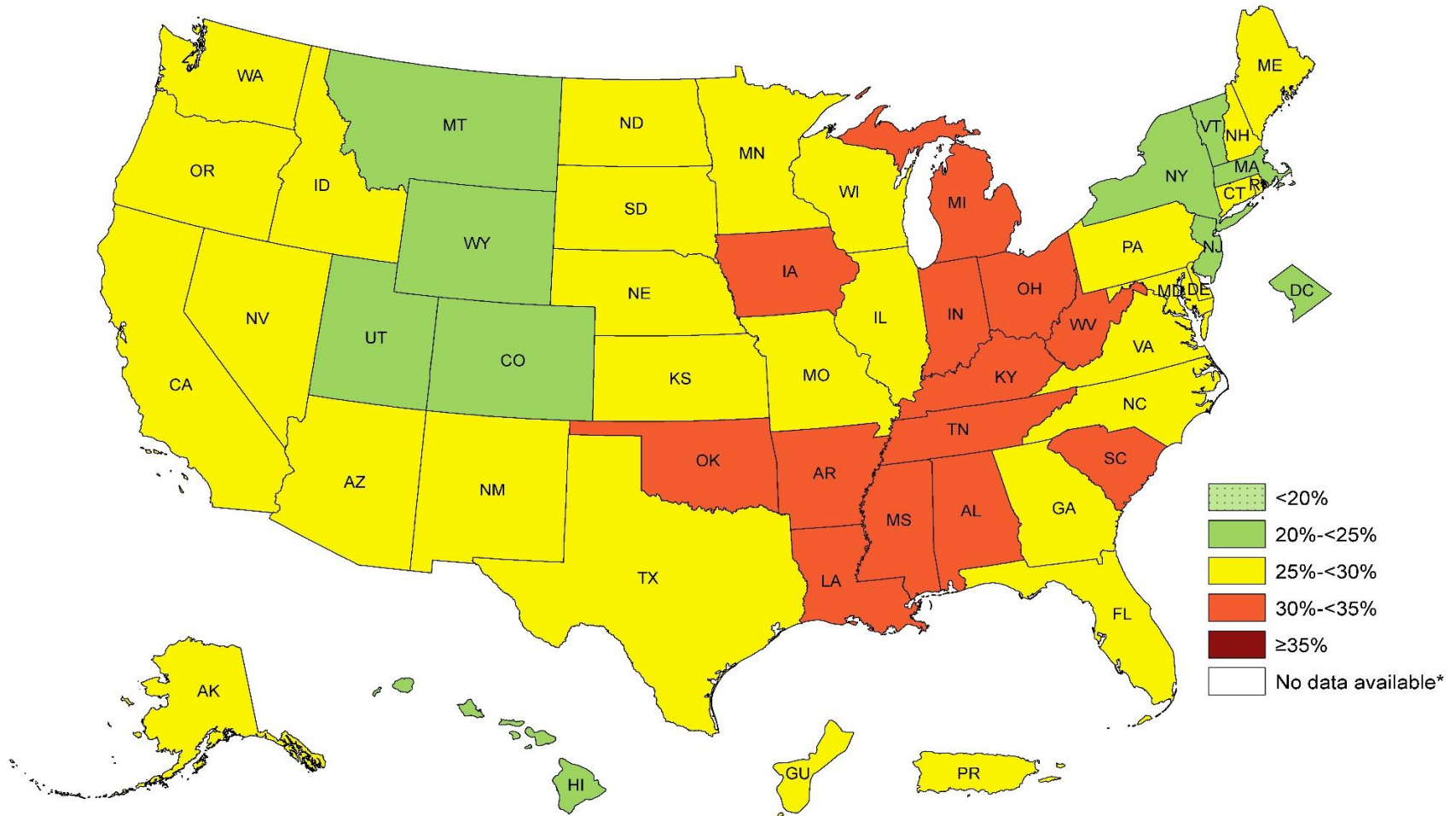
Self-Reported Obesity Among U.S. Adults – BRFSS, 2011



Prevalence estimates reflect BRFSS methodological changes started in 2011. These estimates should not be compared to prevalence estimates before 2011.

<http://www.cdc.gov/obesity/data/prevalence-maps.html>

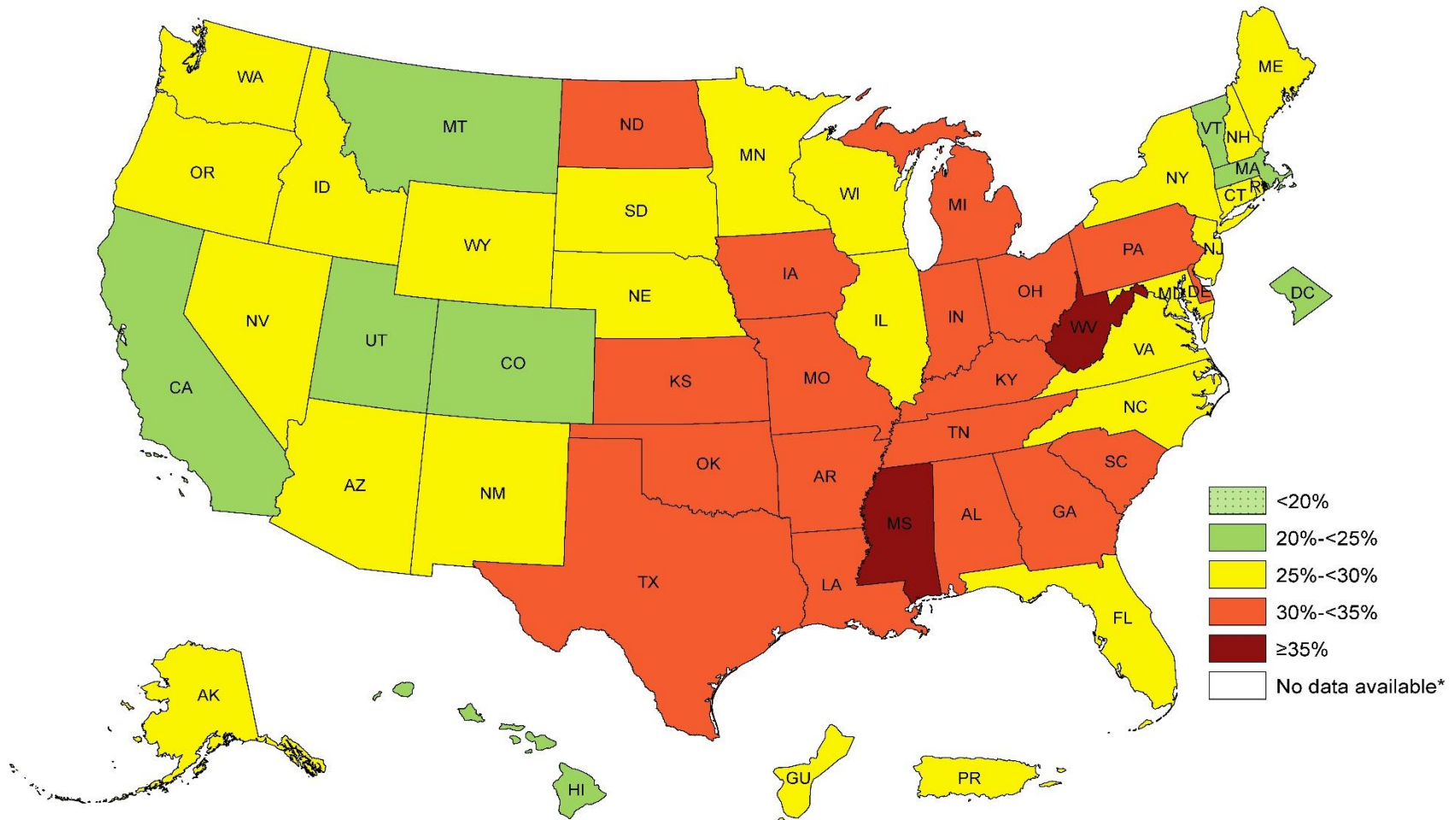
Self-Reported Obesity Among U.S. Adults – BRFSS, 2012



Prevalence estimates reflect BRFSS methodological changes started in 2011. These estimates should not be compared to prevalence estimates before 2011.

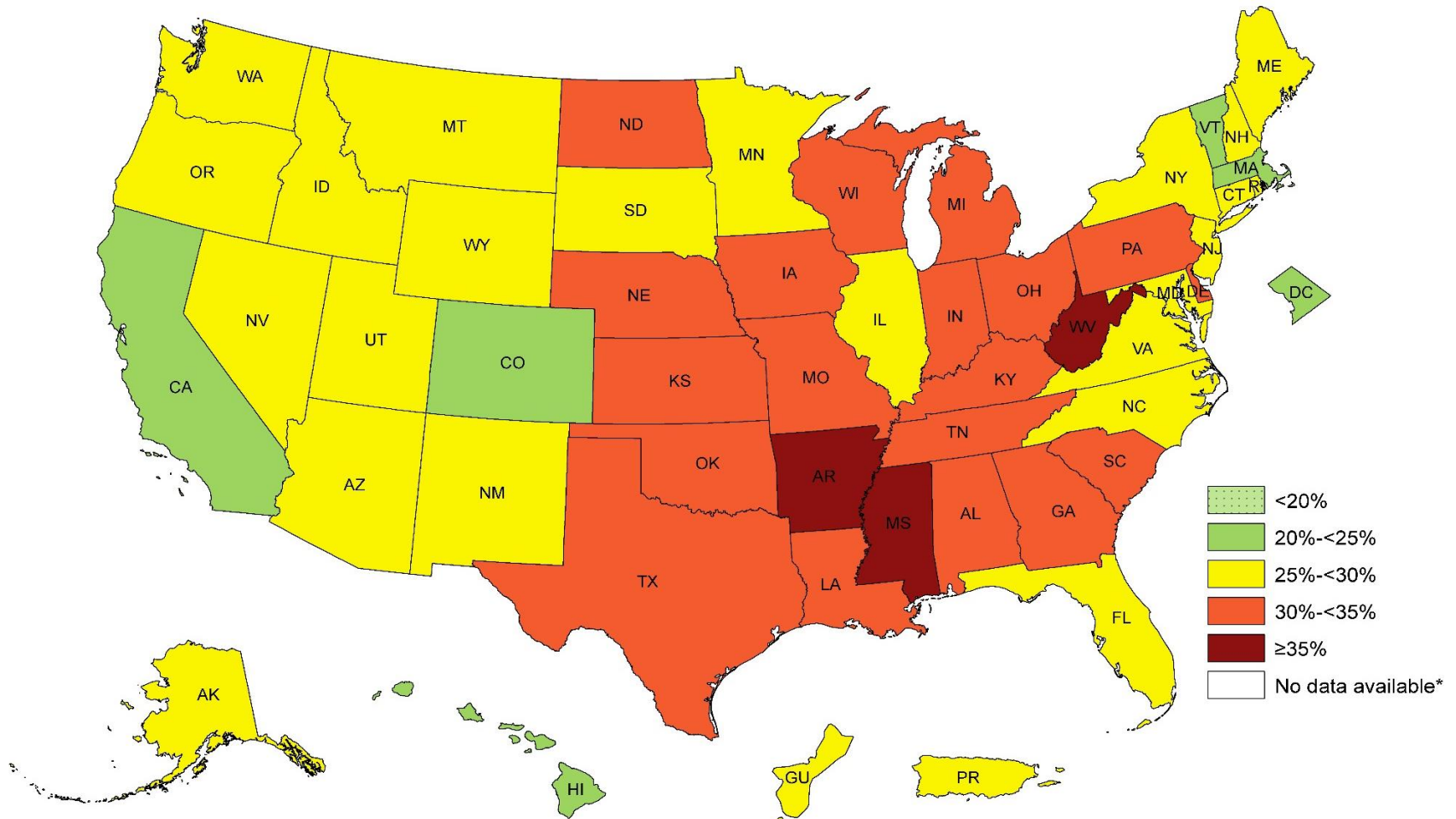
<http://www.cdc.gov/obesity/data/prevalence-maps.html>

Self-Reported Obesity Among U.S. Adults – BRFSS, 2013



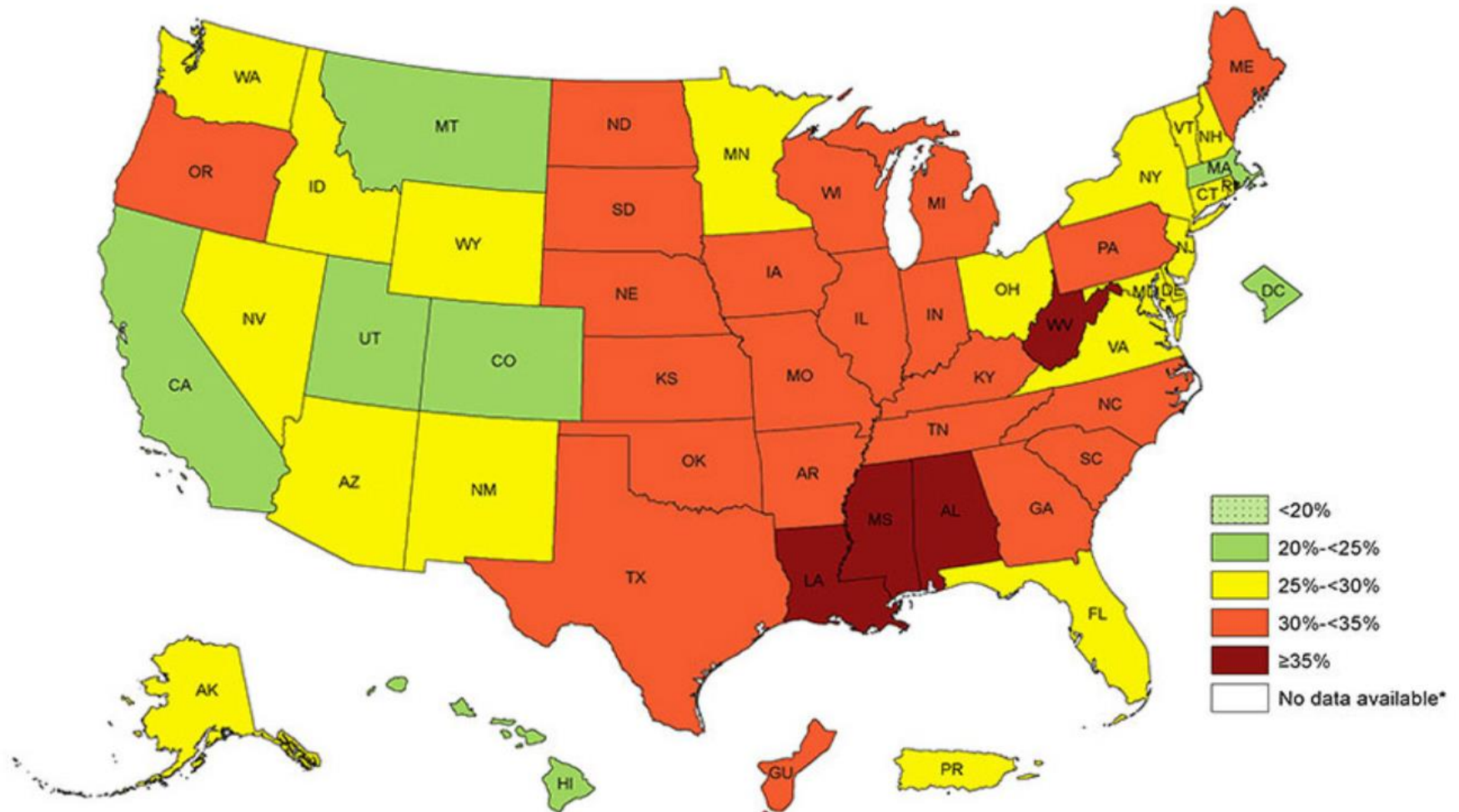
Prevalence estimates reflect BRFSS methodological changes started in 2011. These estimates should not be compared to prevalence estimates before 2011.

Self-Reported Obesity Among U.S. Adults – BRFSS, 2014



Prevalence estimates reflect BRFSS methodological changes started in 2011. These estimates should not be compared to prevalence estimates before 2011.

Self-Reported Obesity Among U.S. Adults – BRFSS, 2015



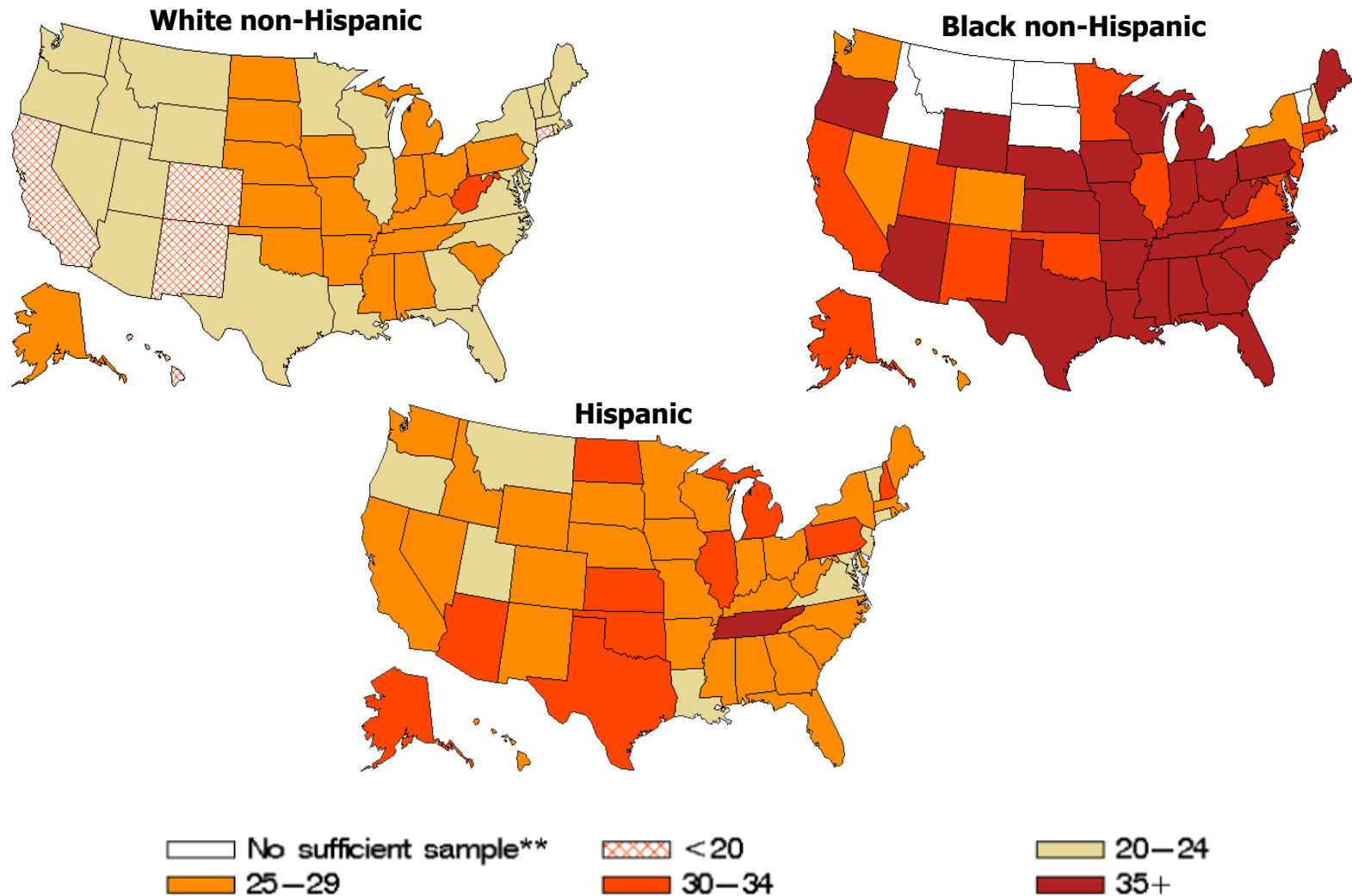
Prevalence estimates reflect BRFSS methodological changes started in 2011. These estimates should not be compared to prevalence estimates before 2011.

<http://www.cdc.gov/obesity/data/prevalence-maps.html>

Obesity Trends 1990–2014

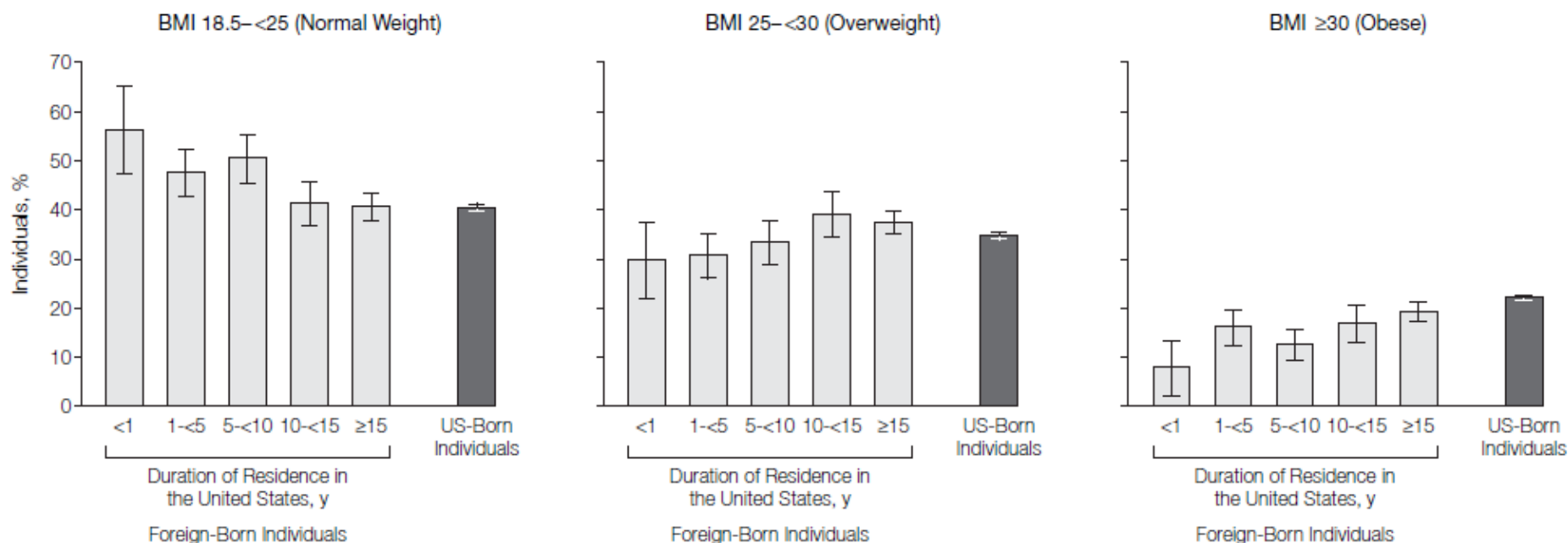
- ◆ In 1990, ten states had a prevalence of obesity less than 10% and no states had prevalence equal to or greater than 15%.
- ◆ By 2000, no state had prevalence less than 10%, 23 states had a prevalence of obesity between 20–24%, and no state had prevalence equal to or greater than 25%.
- ◆ By 2014, no state had a prevalence of obesity less than 20%. Forty-two states had a prevalence equal to or greater than 25%. Three states (Arkansas, Mississippi, and West Virginia) had obesity prevalence greater than 35%.

State-specific Prevalence of Obesity Among U.S. Adults, by Race/Ethnicity, 2006–2008



Are Race/Ethnicity Differences Genetic or Behavioral?

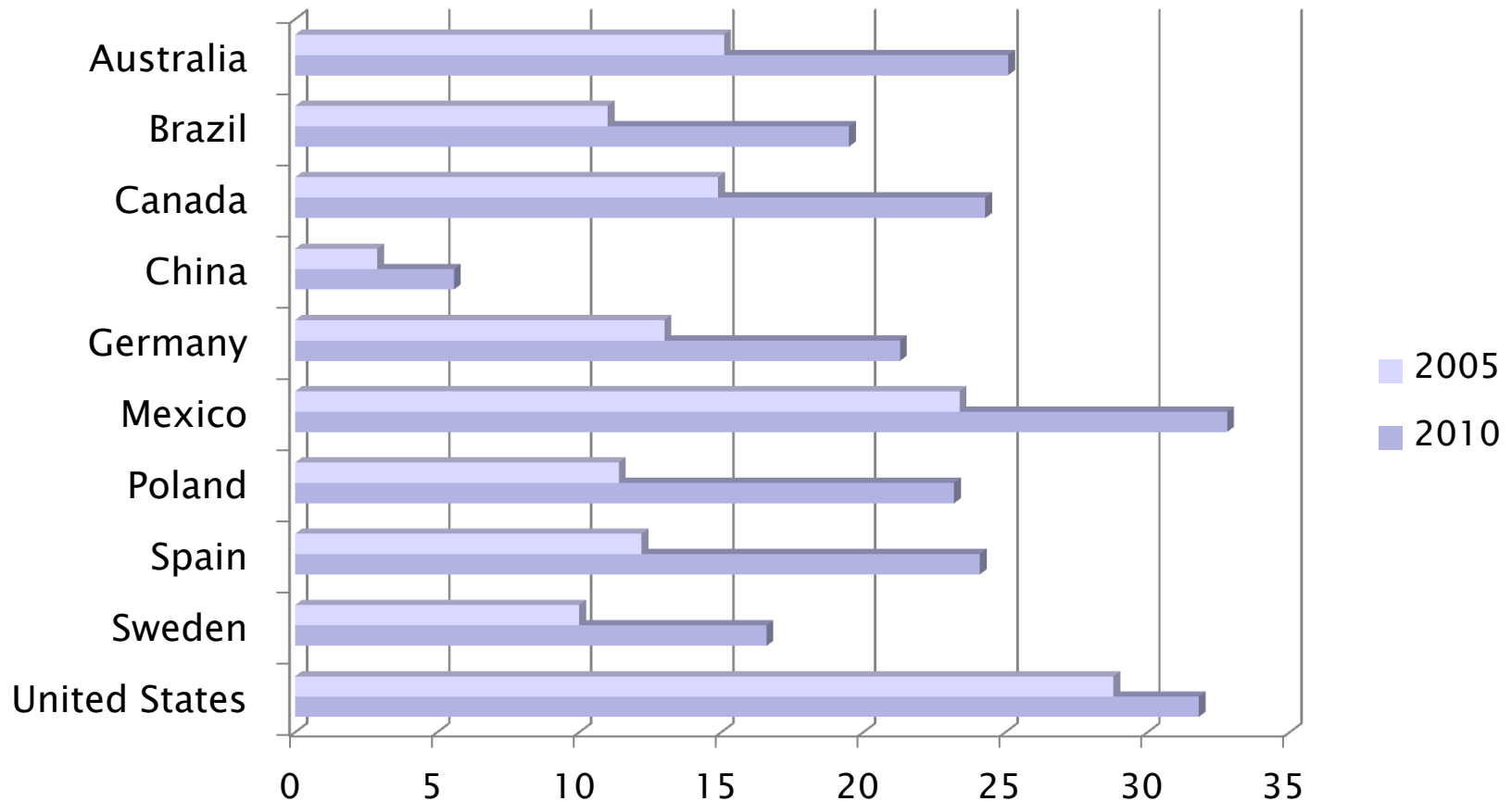
Figure. Adjusted Body Mass Index of Foreign-Born Individuals (n = 4631) by Years of US Residence



Body mass index was calculated as weight in kilograms divided by height in meters squared. Estimates were adjusted for age and sex and weighted to reflect national population estimates. Data for underweight respondents are not reported. $P < .001$ for trend in the age- and sex-adjusted prevalence of obesity with longer duration of US residence among foreign-born individuals. Error bars represent 95% confidence intervals.

“The prevalence of obesity among immigrants living in the United States for at least 15 years approached that of US-born adults. Early intervention with diet and physical activity may represent an opportunity to prevent weight gain, obesity, and obesity-related chronic illnesses.”

International Obesity Rates



Although obesity is a global health issue, some countries have more to worry about than others. The trend is increasing obesity in most countries.

In December 2001, the Surgeon General reported that about 300,000 deaths per year were associated with overweight and obesity, and warned that those health conditions might soon cause as much preventable disease and death as smoking.



Fortune Magazine 2-3-2003

Health Risks Associated with Being Overweight

- ◆ Coronary heart disease
- ◆ Hypertension
- ◆ Hypercholesterolemia
- ◆ Diabetes

- ◆ Metabolic syndrome
 - abdominal obesity
 - high blood pressure
 - high blood sugar
 - high blood fats



HBO – The Weight of the Nation

Some experts project that
by **2030** between **32%** and **52%**
of American adults
may be **OBESE**

HBO

HBO – The Weight of the Nation



www.youtube.com/watch?v=ie6-1kqEIDU&hd=1

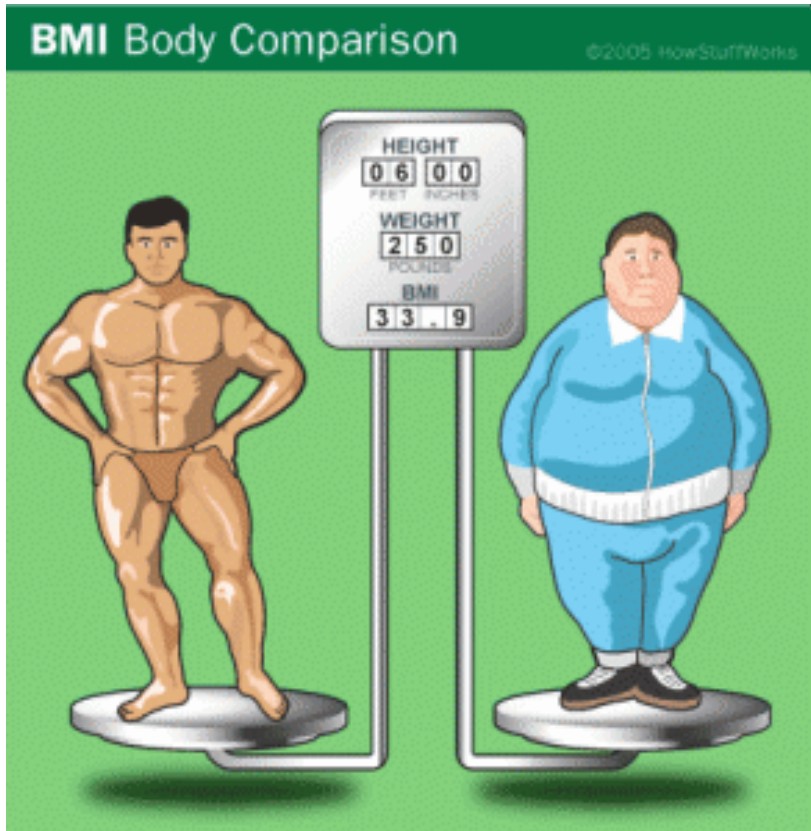
Definitions of Overweight

(Based on BMI values)

- ◆ BMI accounts for differences in frame size better than height weight tables.
- ◆ $BMI = Wt \text{ (kg)} / Ht^2 \text{ (m)}$
- ◆ Standards:
 - Overweight: > 25
 - Obesity: > 30
 - Severe obesity (morbid obesity) > 40

Problem: BMI does not take muscle mass into account

Body Mass Index



- ◆ Body mass index (BMI), established by the NIH in 1998, is an estimate of a person's body fat and health risks.
- ◆ Please keep in mind that BMI is only a guide and is not perfect.
- ◆ BMI does not consider individual factors such as bone or muscle mass.

Regional Fat Distribution



- ◆ Most men store fat in the abdomen, lower back, chest, and nape of the neck (android fat)

Apple shape

Regional Fat Distribution



- ◆ Most women store fat in the hips, buttocks, thighs, and breasts (gynoid fat)

Pear shape

Regional Fat Distribution

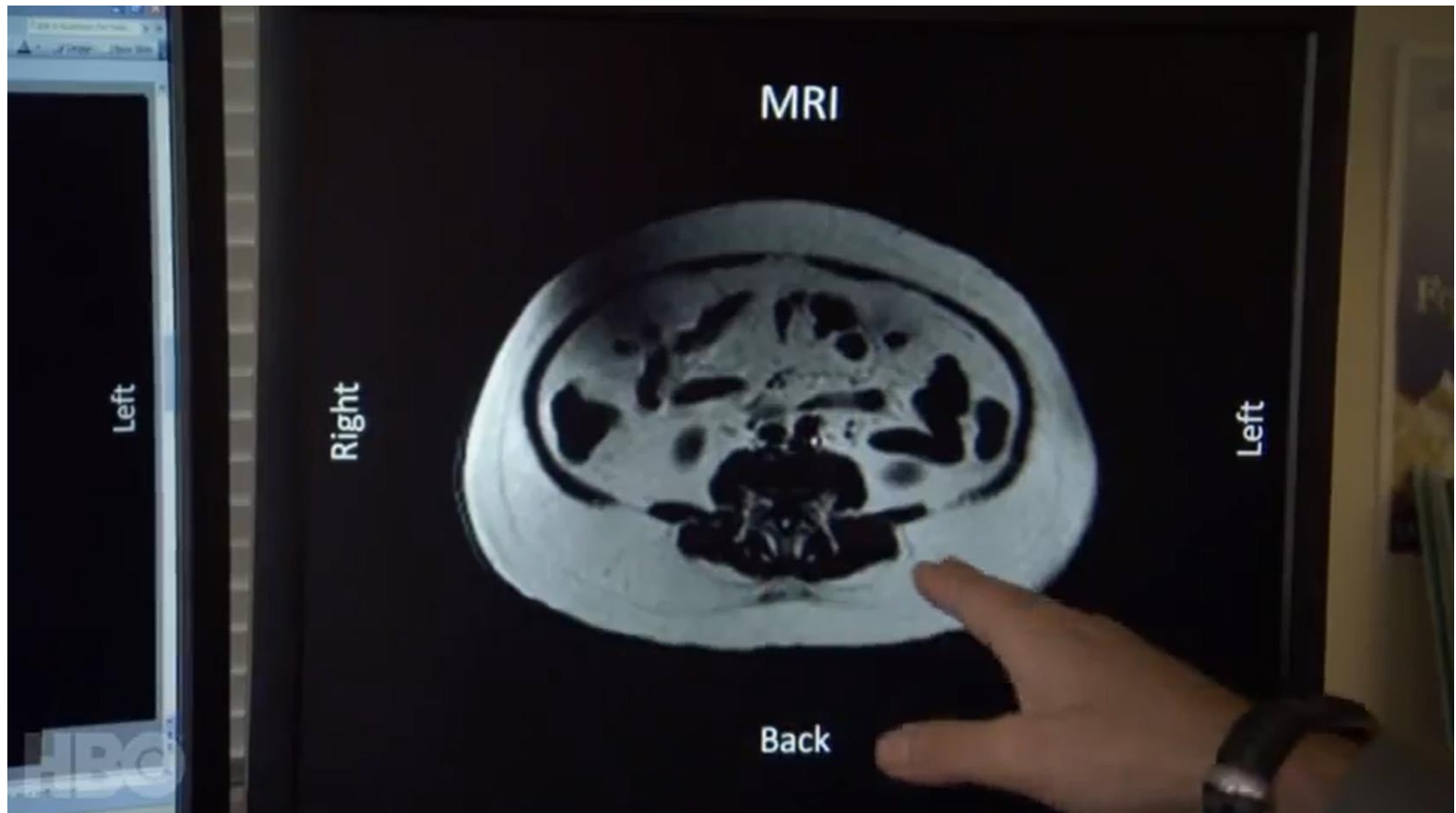
- ◆ Intra-abdominal fat is stored deep in the abdominal cavity and carries a high risk for certain diseases



Regional Fat Distribution

- ◆ Enzymes in abdominal fat cells allow these fat cells to be routed directly to the liver for the production of cholesterol
- ◆ Abdominal cells are larger than other fat cells; large fat cells are associated with blood glucose intolerance and excessive blood insulin (associated with diabetes)
- ◆ Excessive blood insulin may promote hypertension

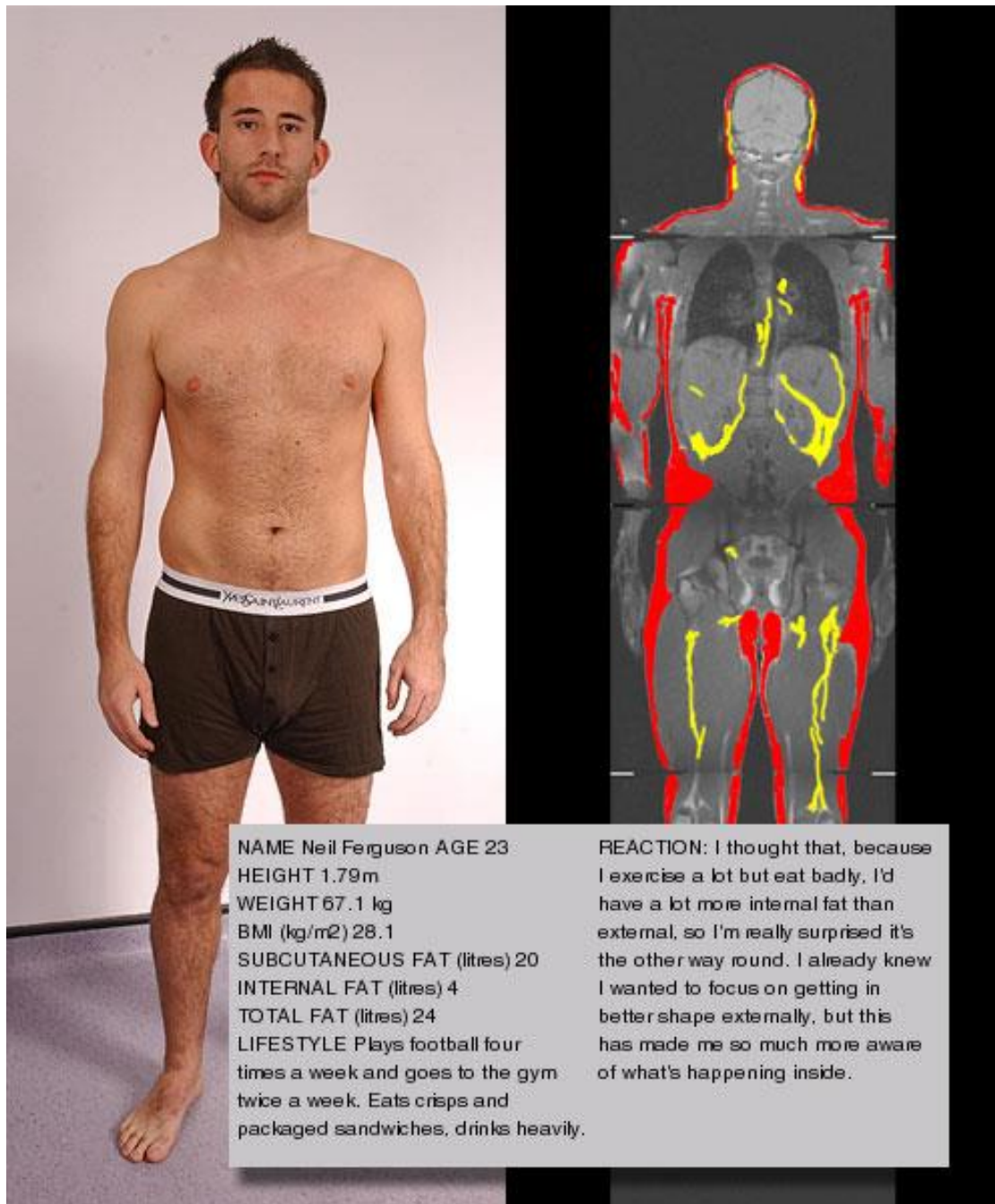
HBO – The Weight of the Nation

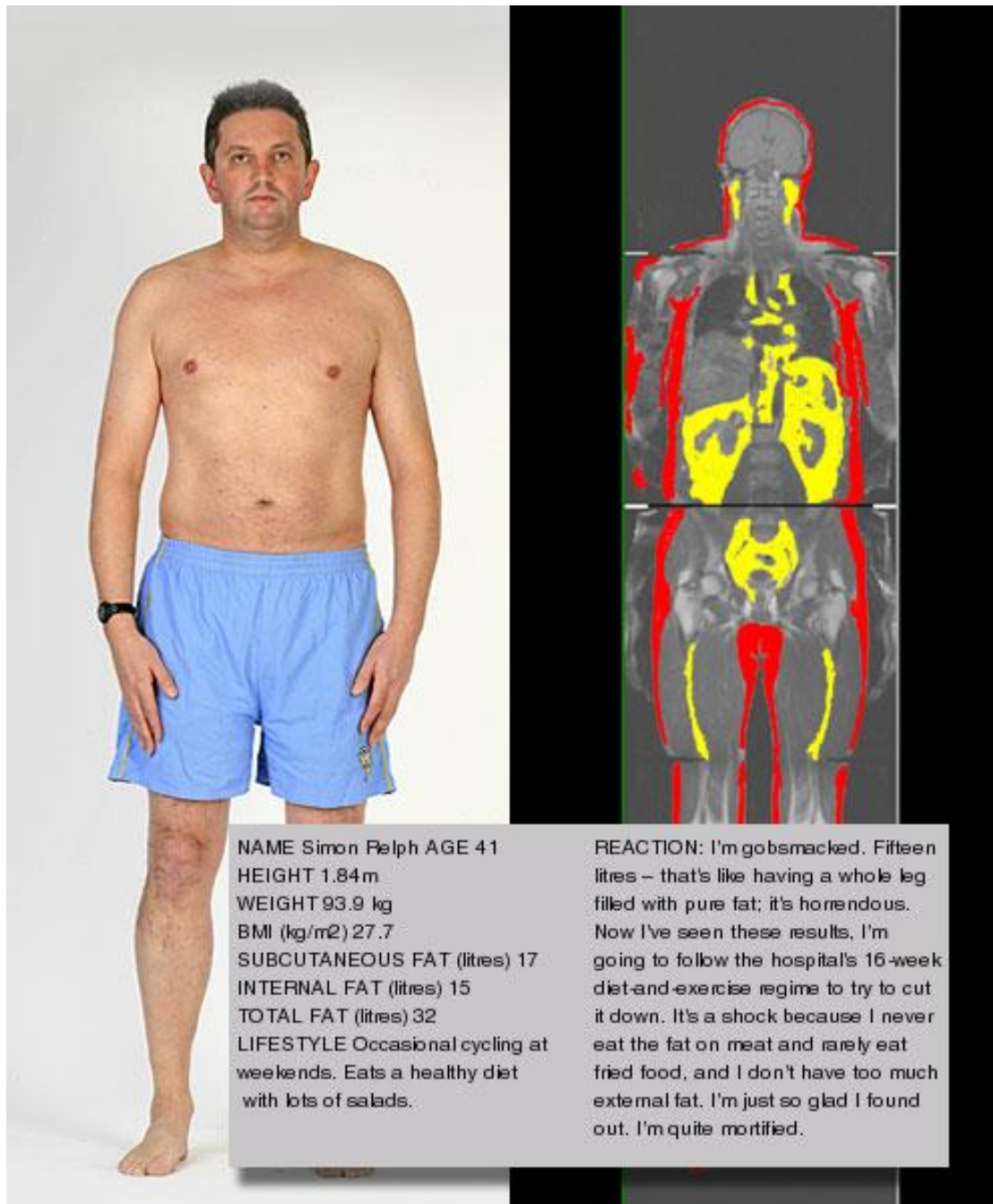


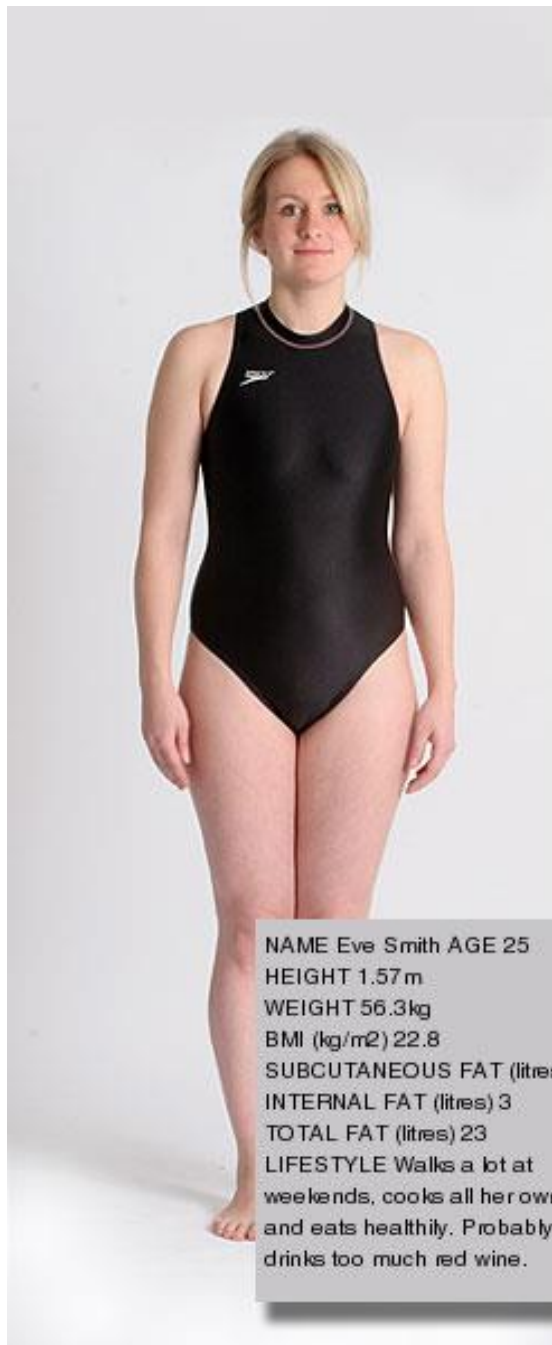
www.youtube.com/watch?v=n6ynwRb2rR0&hd=1

TOFI – Thin outside, Fat inside

- ◆ Normal weight obesity: An individual might be within the normal BMI range, but still carry a lot of abdominal fat.
- ◆ Internal fat surrounding vital organs like the heart, liver or pancreas — invisible to the naked eye — could be as dangerous as the more obvious external fat that bulges underneath the skin.
- ◆ As many as 45% of women with normal BMI scores (20 to 25) actually had excessive levels of internal fat. Among men, the percentage was nearly 60%.
- ◆ Normal-weight persons who are sedentary and unfit are at much higher risk for mortality than obese persons who are active and fit.

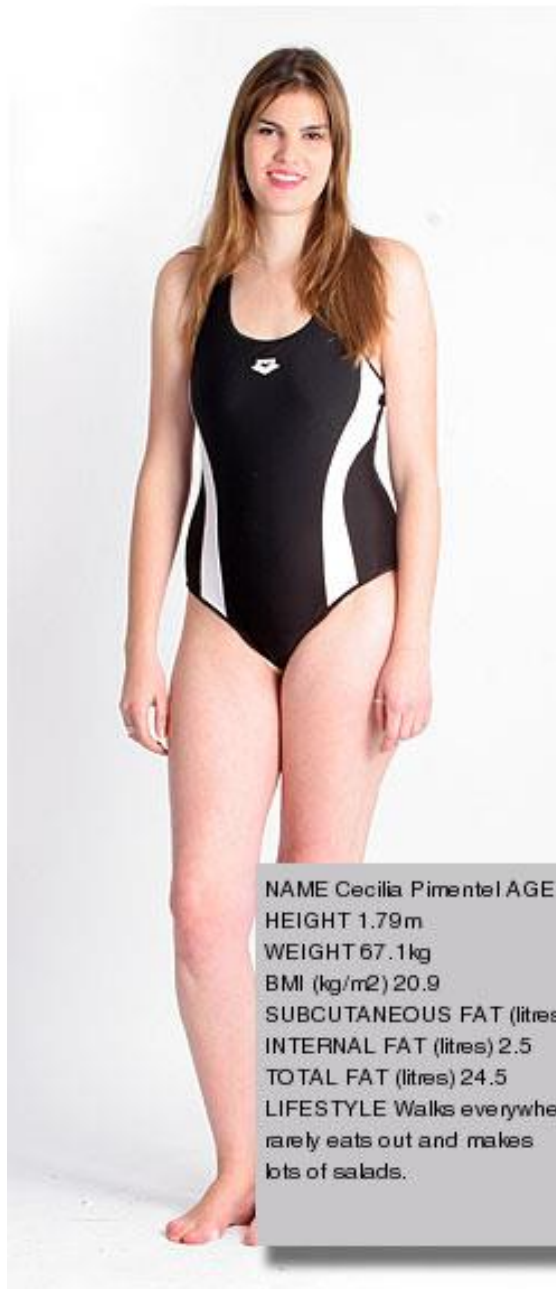




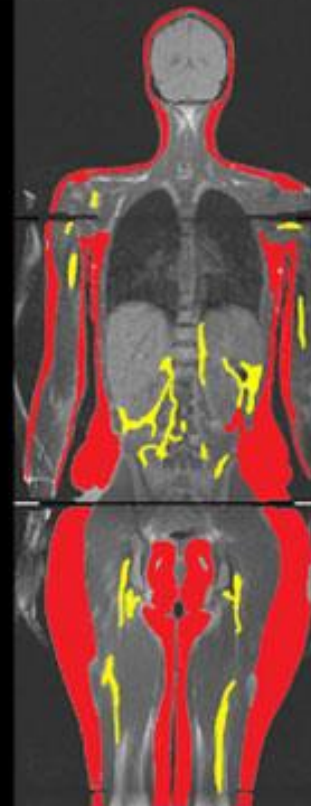


NAME Eve Smith AGE 25
HEIGHT 1.57m
WEIGHT 56.3kg
BMI (kg/m²) 22.8
SUBCUTANEOUS FAT (litres) 20
INTERNAL FAT (litres) 3
TOTAL FAT (litres) 23
LIFESTYLE Walks a lot at weekends, cooks all her own food and eats healthily. Probably drinks too much red wine.

REACTION: I'm amazed because I was worried my internal fat level would be higher. The pictures really prove that you can't expect it to be a certain way from the way you look on the outside. I'd be really interested to see if exercising more reduced the internal fat as well as the external.



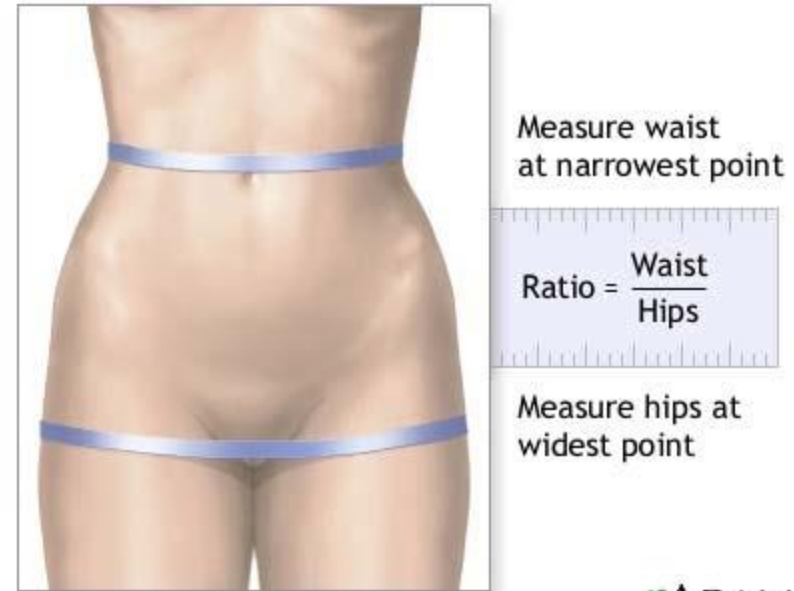
NAME Cecilia Pimentel AGE 24
HEIGHT 1.79m
WEIGHT 67.1kg
BMI (kg/m²) 20.9
SUBCUTANEOUS FAT (litres) 22
INTERNAL FAT (litres) 2.5
TOTAL FAT (litres) 24.5
LIFESTYLE Walks everywhere,
rarely eats out and makes
lots of salads.



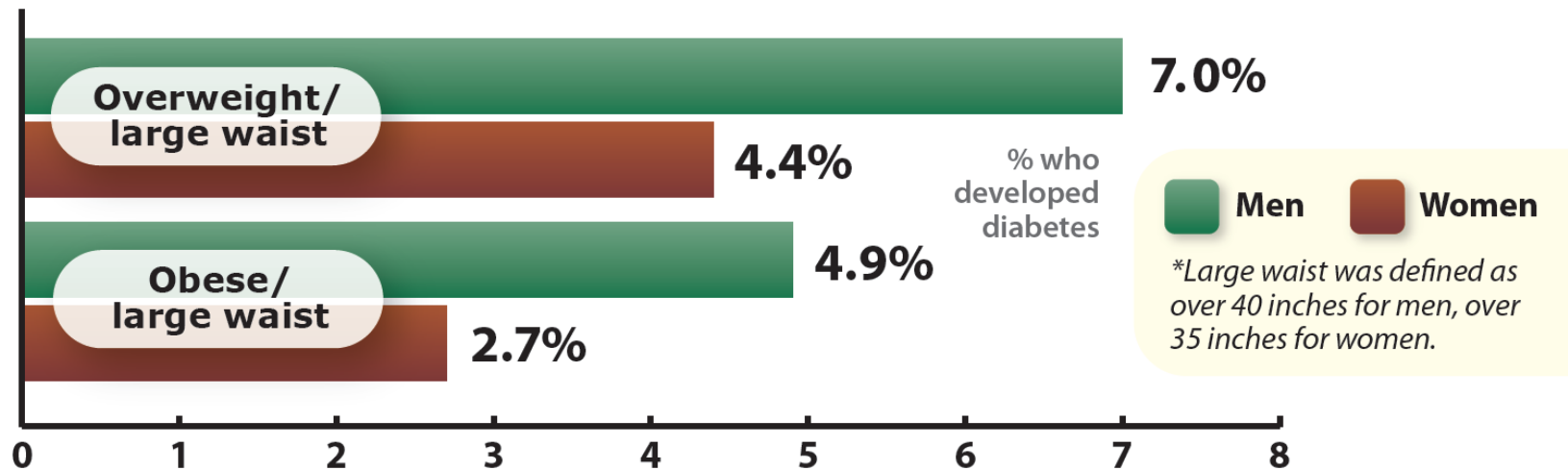
REACTION: It's a relief that I'm on the low side. I have big hips and the scan really shows up the fat there. But I'm glad I don't have too much fat on the inside. I'm especially pleased because I do have high cholesterol, which is genetic, and I'm glad that doesn't mean I have lots of internal fat too. I walk everywhere, which must be helping.

Methods of Measurement

- ◆ The waist-to-hip ratio (WHR) is a simple method for determining body fat distribution
- ◆ Waist circumference can also predict disease risk

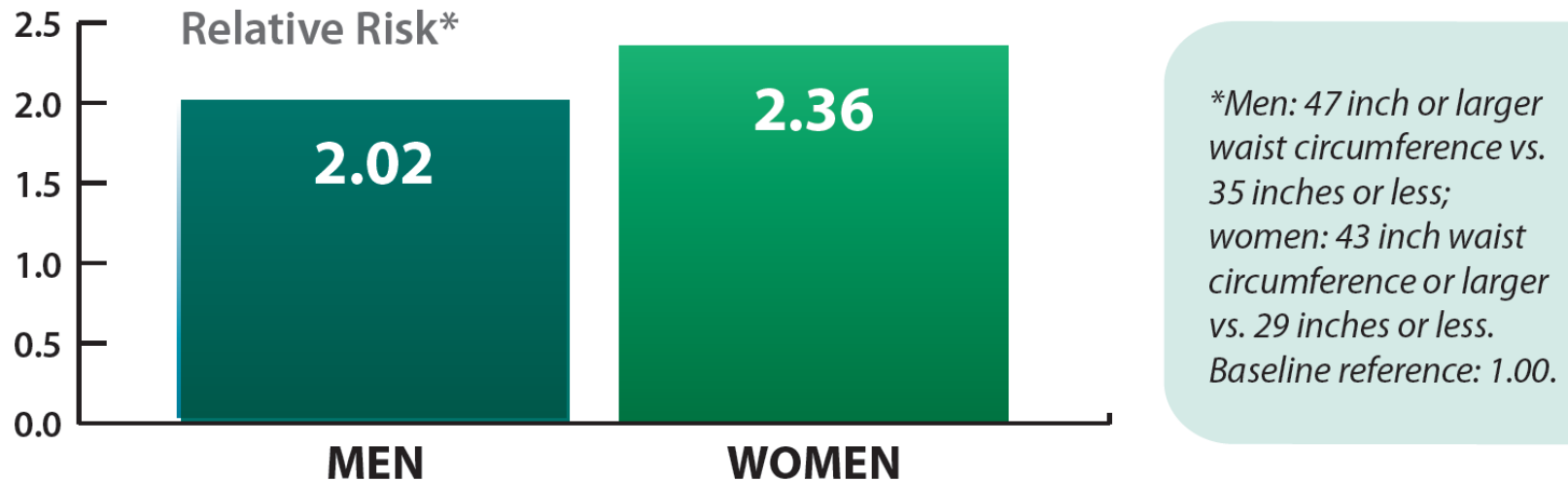


What's Riskier: Large Waist or High BMI?



Recent research confirms previous evidence suggesting BMI is less important than waist circumference in predicting long-term health risks, particularly type 2 diabetes

Waist Circumference



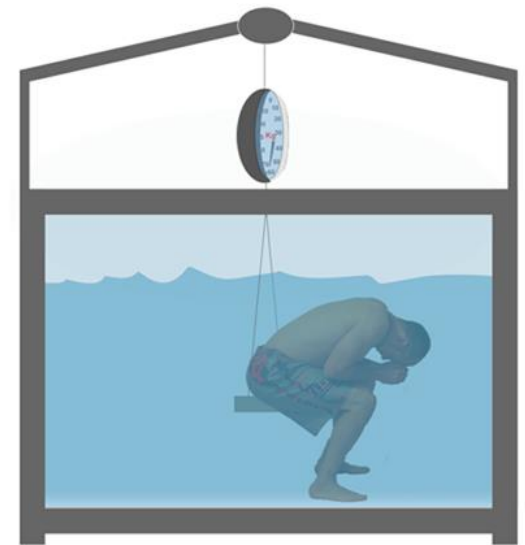
In a large US cohort (48,500 men and 56,343 women, 50 years or older), waist circumference (WC), a measure of abdominal obesity, is associated with higher mortality independent of body mass index (BMI).



Height/weight tables do not measure body composition and are poor instruments for weight-loss recommendations

Measuring Body Composition

- ◆ The only direct way to measure the fat content of humans is through chemical analysis of cadavers
- ◆ Underwater weighing is one of the most accurate indirect measurement techniques
- ◆ People with more muscle mass weigh more in water than those with less muscle



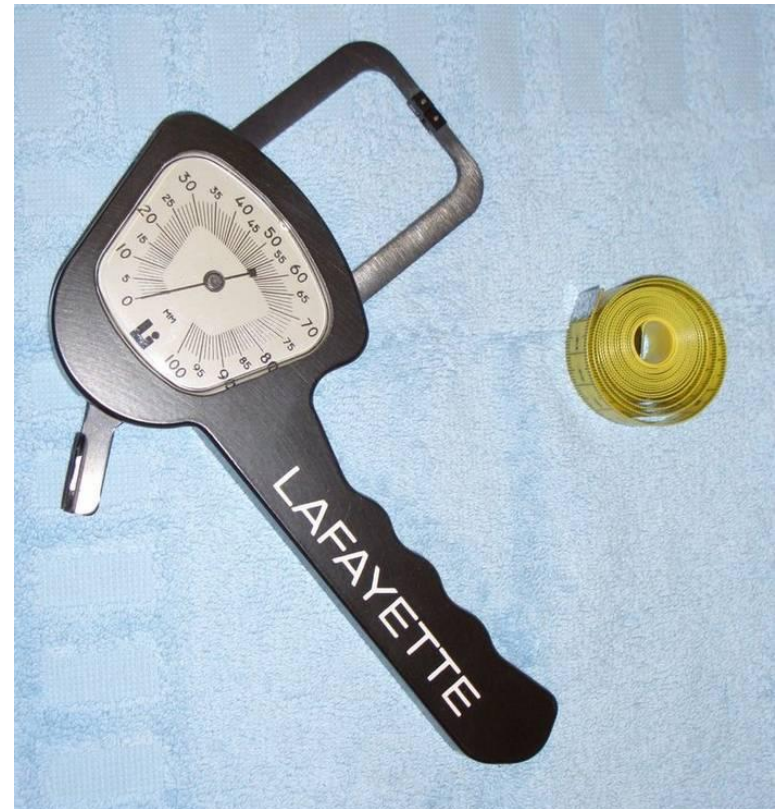
Measuring Body Composition

- ◆ Air-Displacement Plethysmography uses air displacement rather than water displacement for assessing body composition by sitting in the Bod Pod



Measuring Body Composition

- ◆ Skinfold measurements are an economical way to measure body composition
- ◆ In the hands of a skilled tester, it can be accurate
- ◆ However, newer methods such as infrared are much more convenient



Measuring Body Composition

- ◆ The Futrex 6100/XL instrument uses near-infrared (NIR) light to determine body fat
 - Body fat absorbs NIR light
 - Lean mass (bone & muscle) reflects NIR light



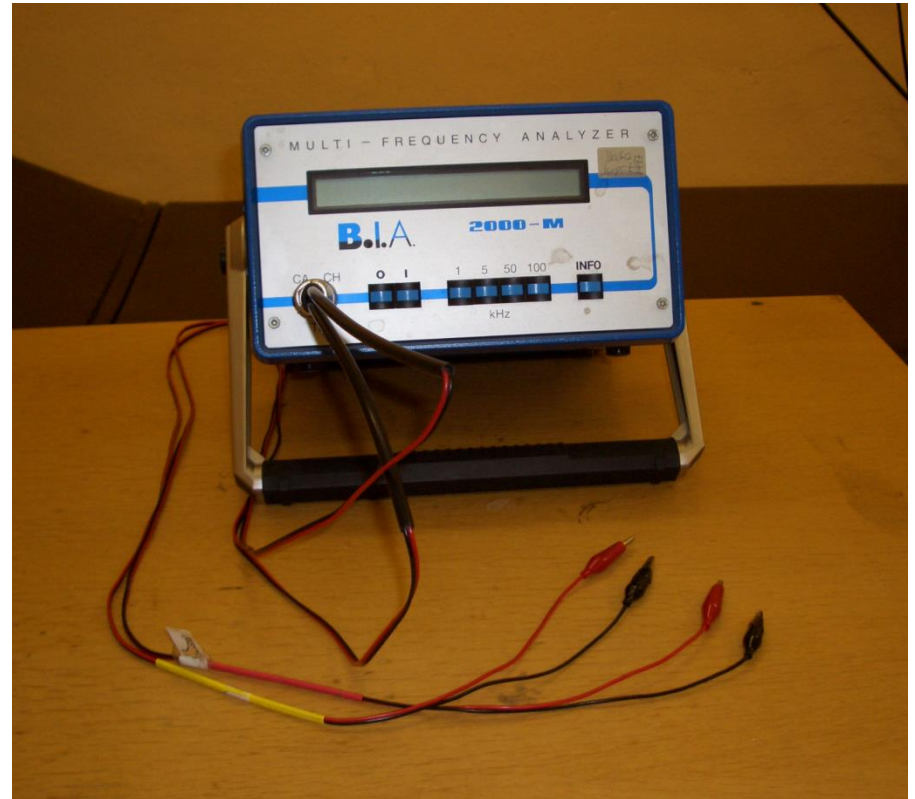
Health Smart Body Fat Analyzer

- ◆ The infrared tester is very self consistent.
- ◆ So while it might be slightly off as compared to the 'Gold Standard', if you produce a 2% change in your patient, that is a real 2%.



Measuring Body Composition

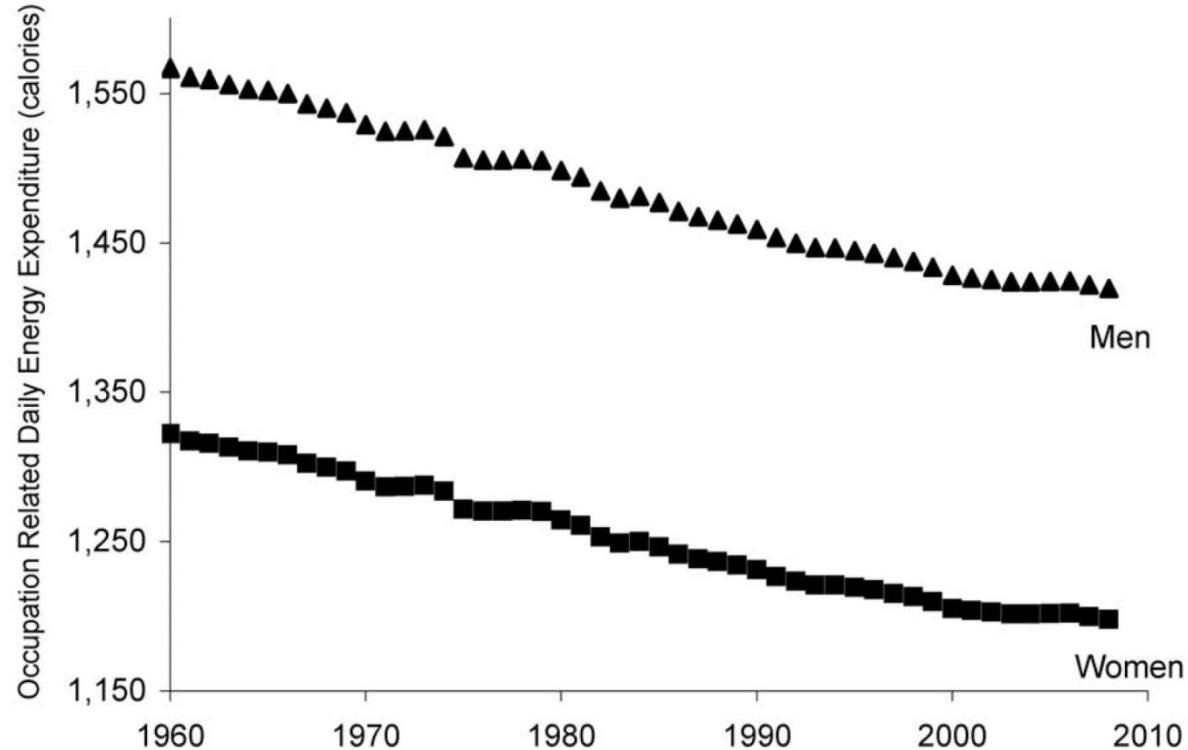
- ◆ Bioelectrical impedance analysis uses a low-level, single-frequency electric current to measure body composition





**“Inside me there’s a thin person struggling to get out.
Hopefully he’s burning a lot of calories!”**

Trends in Physical Activity



Over the last 50 years the U.S. daily occupation-related energy expenditure has decreased by more than 100 calories. This reduction in energy expenditure accounts for a significant portion of the increase in U.S. body weights for women and men.

Copyright 2003 by Randy Glasbergen.
www.glasbergen.com



“What fits your busy schedule better, exercising one hour a day or being dead 24 hours a day?”

Physical Activity Guidelines

- ◆ Physical Fitness
 - Performance-related fitness
 - Health-related fitness
- ◆ Physical activity includes all types of movement whereas physical fitness implies a certain level of physical performance
- ◆ Physical Activity vs. Exercise
 - Physical activity examples: raking leaves, cleaning house, or climbing stairs
 - Exercise examples: jogging, basketball, or dancing

Components of Performance-Related Fitness

- ◆ Speed
- ◆ Power
- ◆ Balance
- ◆ Coordination
- ◆ Agility
- ◆ Reaction time



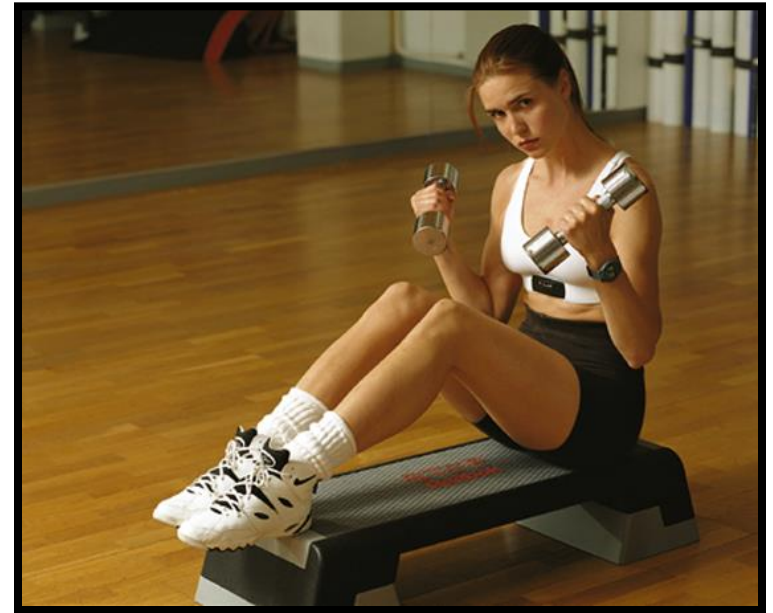
Components of Health-Related Fitness

- ◆ Cardiorespiratory endurance
- ◆ Muscular strength
- ◆ Muscular endurance
- ◆ Flexibility
- ◆ Body composition



Reasons for Exercising (Pros)

- ◆ Health and fitness
- ◆ Enjoyment
- ◆ Relaxation
- ◆ Challenge
- ◆ Social
- ◆ Appearance
- ◆ Competition
- ◆ Feel good about self
- ◆ Chance to be outdoors



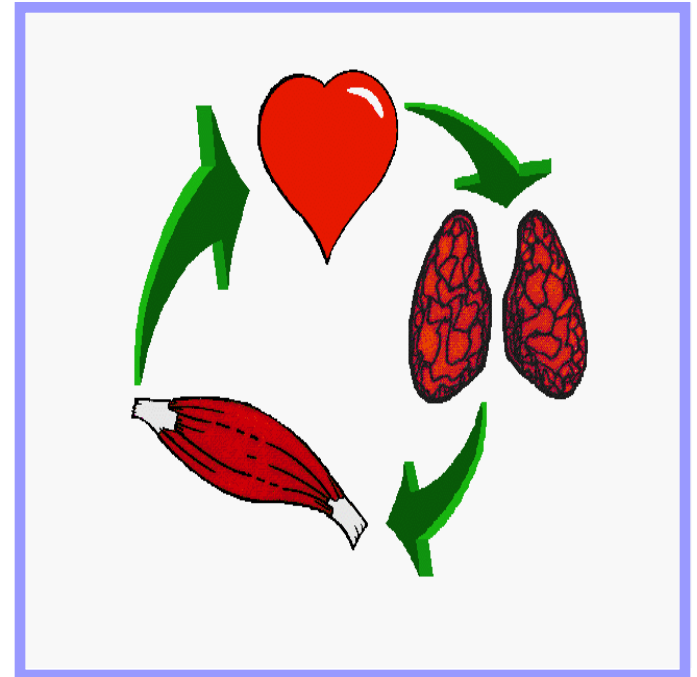
Reasons for Not Exercising (Cons)

- ◆ Not enough time
- ◆ Inconvenient
- ◆ Not enjoyable
- ◆ Poor health/fatigue
- ◆ Lack of facilities
- ◆ Bad weather



Physiological Changes During Exercise

- ◆ Increased ventilation
- ◆ Increased heart rate
- ◆ Increased muscle blood flow



Cardiorespiratory Endurance

- ◆ Cardiorespiratory endurance is the ability to take in, deliver, and extract oxygen for physical work
- ◆ Also called *aerobic capacity*
(maximum oxygen consumption)
- ◆ *Aerobic* means “with oxygen”
- ◆ For health, this is the most important component of physical fitness
- ◆ Cardiorespiratory endurance activities are continuous and of long duration



Cardiorespiratory Endurance



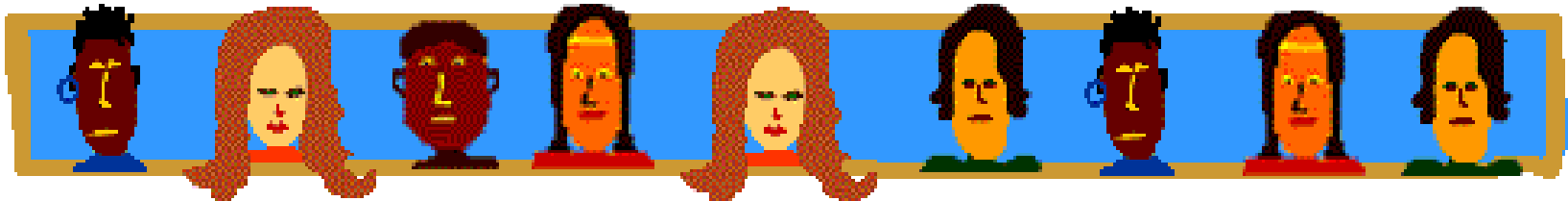
- ◆ Resting heart rate decreases 15 to 20 beats per minute
- ◆ Stroke volume increases
- ◆ Cardiac output: The amount of blood pumped by the heart in 1 minute
- ◆ Cardiac output increases during maximal effort

Chronic Effects of Cardiorespiratory Training

- ◆ Total blood volume increases, lowering blood viscosity
- ◆ Heart volume and heart weight increase
- ◆ Vital capacity and maximal pulmonary ventilation increase while residual volume decreases
- ◆ Aerobic capacity increases 5% to 25% in previously untrained, healthy adults

Cardiorespiratory Endurance and Wellness

- ◆ Consistent participation in exercise is necessary to improve health
- ◆ Regular aerobic exercise reduces many risks associated with cardiovascular disease
- ◆ Sixty percent of American adults are inactive or marginally active
- ◆ “No pain, no gain” – Trying to comply with this adage has done more harm than good to sedentary people attempting to become physically active



Effects of Aerobic Exercise

- ◆ Vital capacity (the amount of air that can be expired after a maximum inspiration) increases
- ◆ HDL increases
- ◆ LDL and Triglycerides decrease
- ◆ Increases myocardial efficiency
 - Lowers resting heart rate
 - Increases stroke volume
- ◆ Increases oxygen carrying capacity of the blood

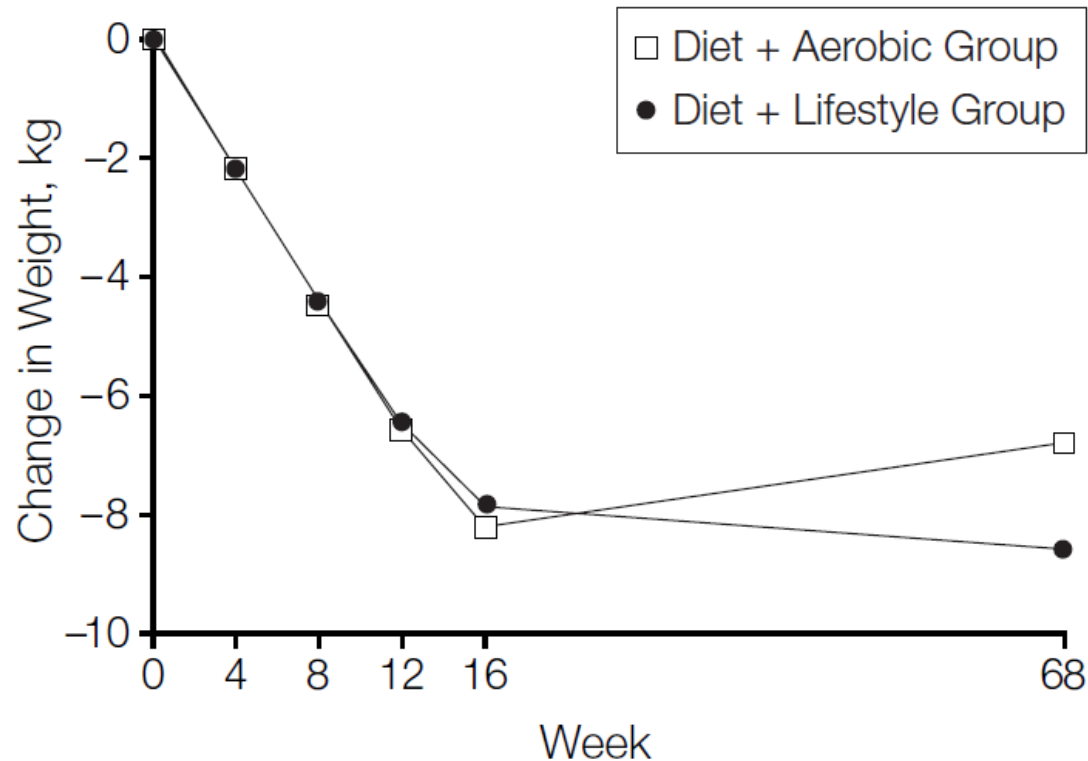
Lifestyle Physical Activity vs. Exercise

- ◆ In the 1970's and 1980's the traditional exercise recommendation was to improve physical fitness by promoting participation in vigorous endurance exercise.
- ◆ Most people did not follow this prescription and 60% of the American public remains sedentary.
- ◆ We now know that the amount (and intensity) of exercise needed to produce health benefits is considerably less than the amount needed to improve physical fitness.

Lifestyle Fitness vs. Aerobic Exercise Training

- ◆ At the end of 2 months, the fitness improvements were greater for children in the programmed aerobic exercise group, but at 6 months, the fitness improvements were equivalent for the lifestyle fitness and programmed aerobic exercise groups.
- ◆ At the 17 month follow-up, the children randomized to the lifestyle physical activity group had less weight regain than children who had been assigned to the aerobic exercise condition.

Effects of Lifestyle Activity vs. Structured Aerobic Exercise in Obese Women



“The diet plus lifestyle program was as effective as the diet plus aerobic training program in improving weight, systolic blood pressure, and serum lipid and lipoprotein levels.”

Principles of Conditioning

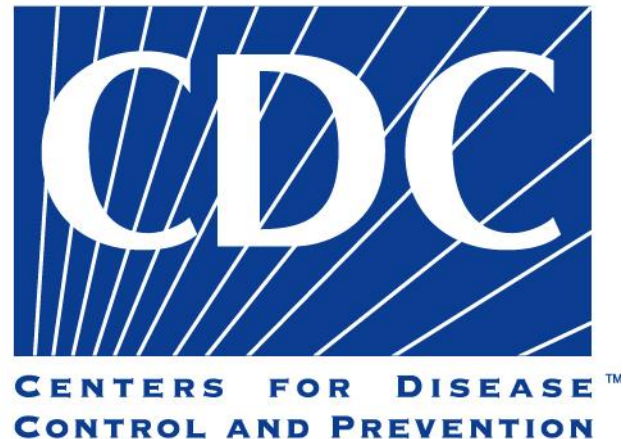


FIT Principle

- Frequency: Number of days of participation each week
- Intensity: Degree of vigorousness of an exercise session
- Time/Duration: Length of time of each exercise session

Recommendation for Exercise

“Every U.S. adult should accumulate 30 minutes or more of moderate intense physical activity on most and preferably all days of the week.”

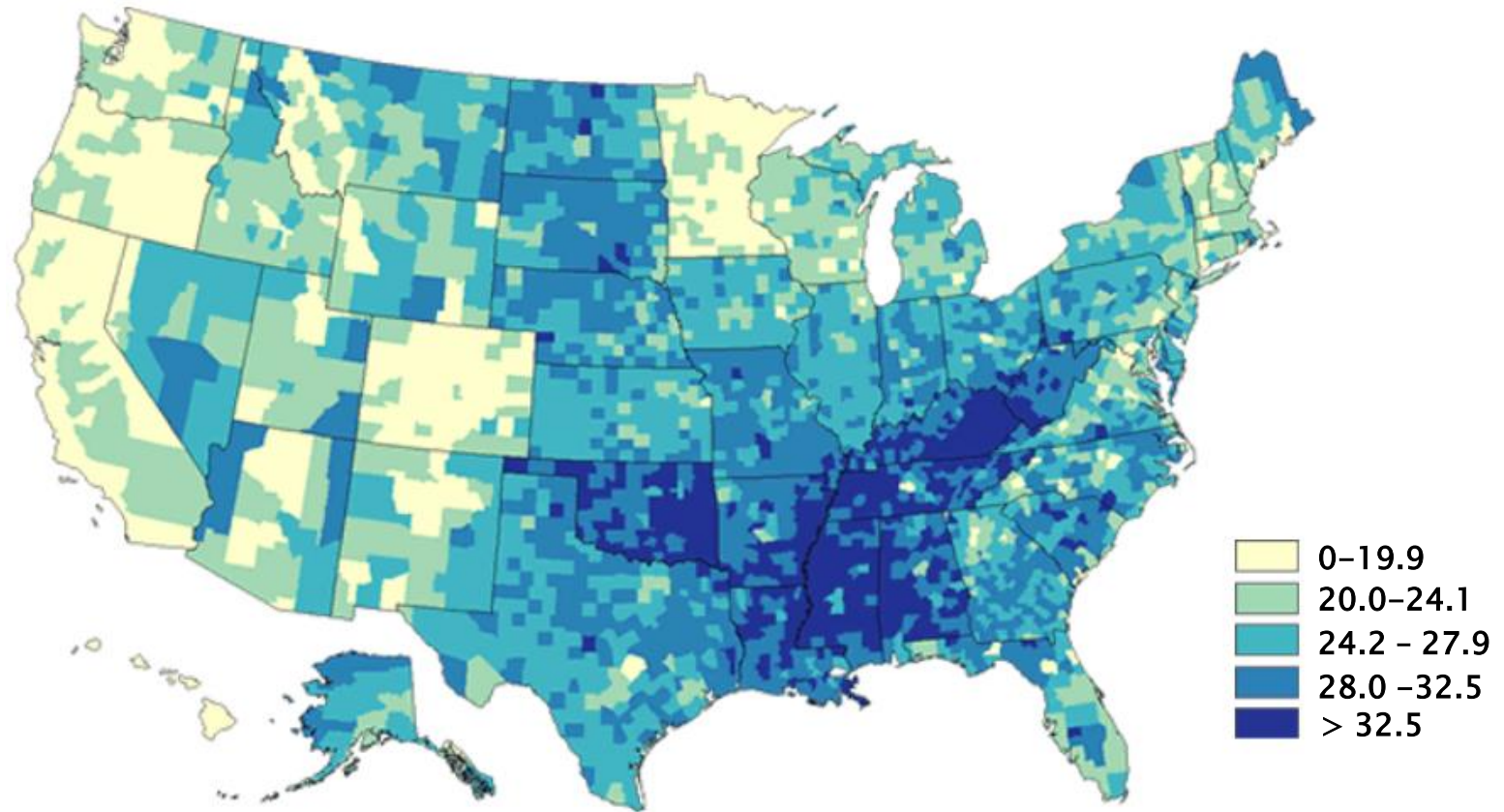


Sitting Time vs. Mortality

- ◆ Not meeting physical activity recommendations is responsible for more than 5 million deaths globally each year.
- ◆ Sedentary behavior is associated with increased risk for type 2 diabetes, cardiovascular disease, and all-cause mortality.
- ◆ High levels of moderate intensity physical activity seem to eliminate the increased risk of death associated with high sitting time.
- ◆ The study recommends 1 hour of moderate intensity activity per 8 hours of sitting.

Does physical activity attenuate, or even eliminate, the detrimental association of sitting time with mortality? (Meta-analysis of 16 studies N=1,005,791)
Lancet 7-27-16 <http://www.ncbi.nlm.nih.gov/pubmed/27475271>

2008 Estimate of Percentage of Adults Who Reported No Leisure Time Physical Activity



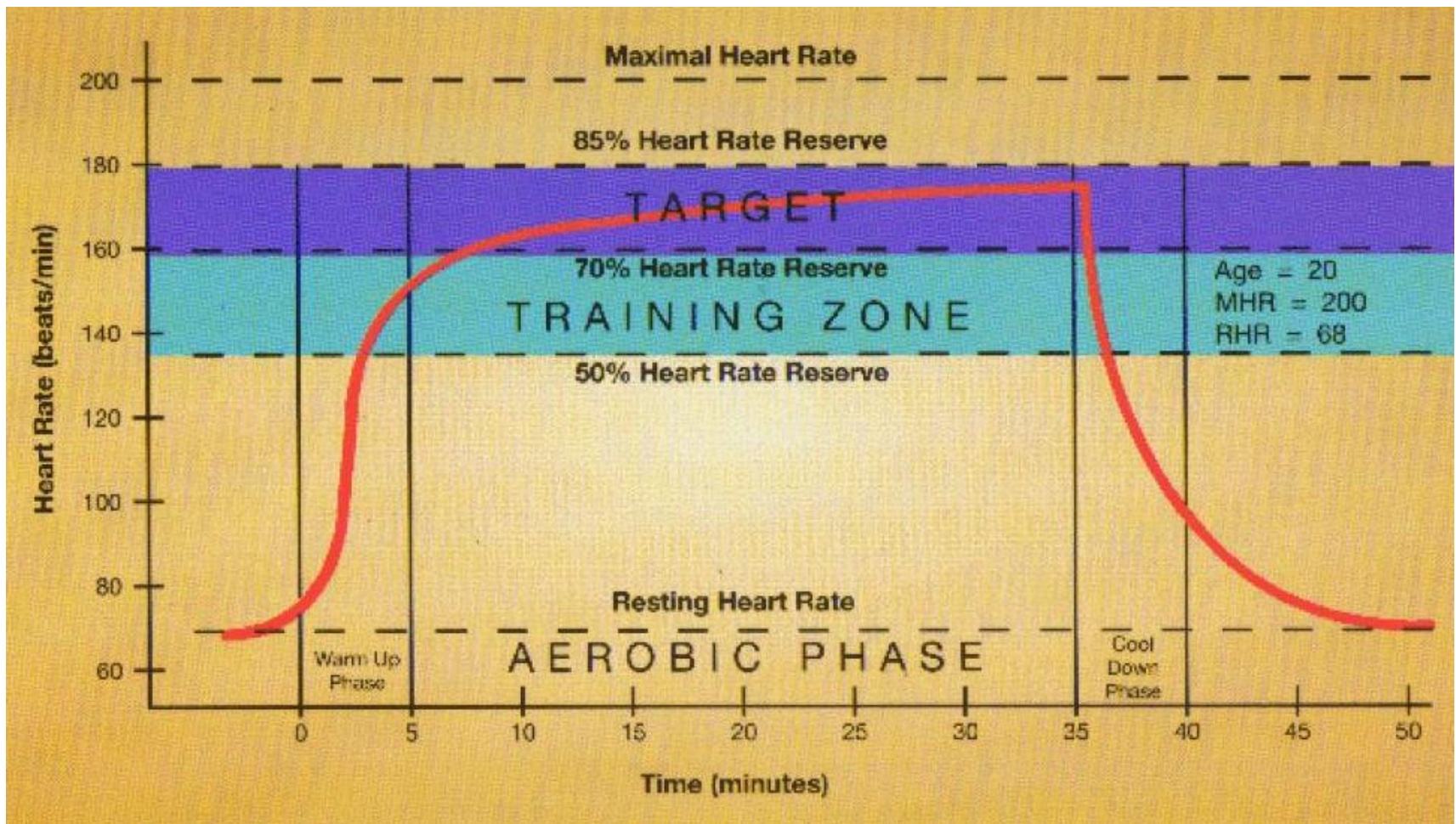
Frequency

- ◆ ‘Most days of the week’ is interpreted to mean 3–5 days a week
- ◆ Fewer than 3 days a week is an inadequate stimulus for developing fitness
- ◆ Overtraining can result in:
 - Loss of enthusiasm for working out
 - An increase in the risk for injury

Intensity

- ◆ Moderate intensity refers to walking a 3–4 mile per hour pace (15–20 minutes per mile)
- ◆ This guideline is a simplification of the more complicated 50–85% of Maximum Heart Rate formula
- ◆ The ‘Talk Test’ – Intensity is excessive when the exerciser is unable to carry on a conversation without gasping for breath between each word or two

Typical cardiovascular or aerobic training pattern



- High cardiovascular endurance training zone
- Moderate cardiovascular endurance training zone

Time (Duration)

- ◆ Intensity and duration are inversely related:
The more intense the exercise, the shorter its duration
- ◆ Reducing the intensity somewhat while increasing the frequency and duration is the safest and most beneficial method for novice exercisers to attain physical fitness and health enhancement
- ◆ ACSM recommends:
 - If you expend 300 calories per exercise session, you should exercise 3 times per week
 - If you expend 200 calories per exercise session, you should exercise 4 times per week

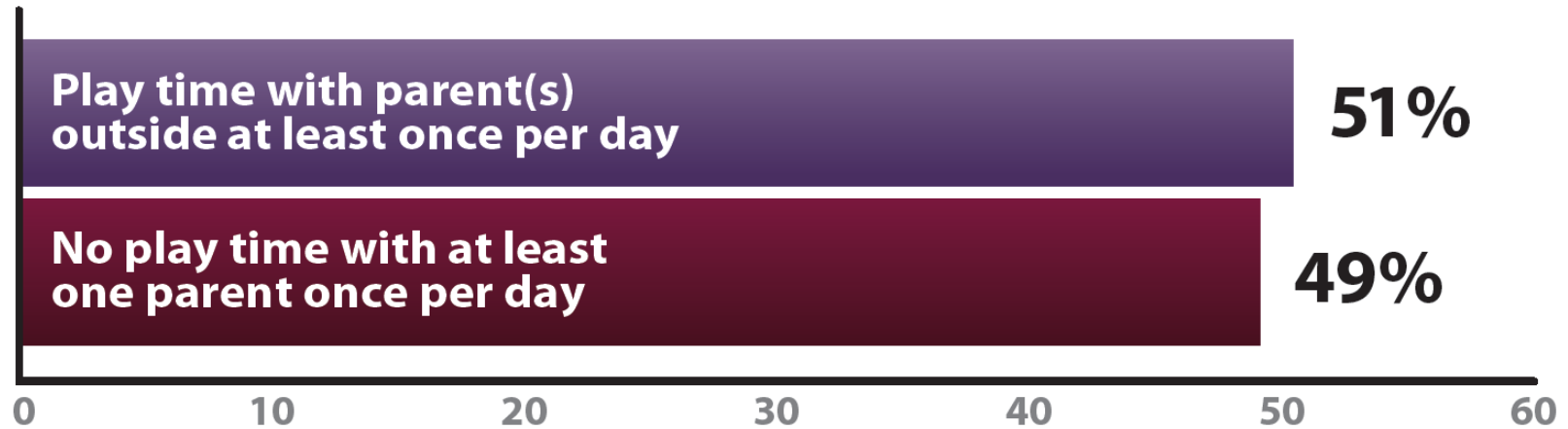
How to Make Exercise Counseling More Effective

- ◆ Overweight adults who had been advised by their physician to exercise more were nearly five times more likely to meet physical activity recommendations if their doctor helped develop an exercise plan.
- ◆ Those who were merely “advised” to exercise more were less likely to meet physical activity recommendations.
- ◆ Physician counseling was most effective when presented as a prescription and followed up with periodic inquiries.

2008 Physical Activity Guidelines for Americans Children and Adolescents (aged 6–17)

- ◆ Children and adolescents should do 60 minutes or more of physical activity every day.
- ◆ Most of the 1 hour or more a day should be either moderate– or vigorous–intensity aerobic physical activity.
- ◆ As part of their daily physical activity, children and adolescents should do vigorous–intensity activity on at least 3 days per week.
- ◆ They also should do muscle–strengthening and bone–strengthening activity on at least 3 days per week.

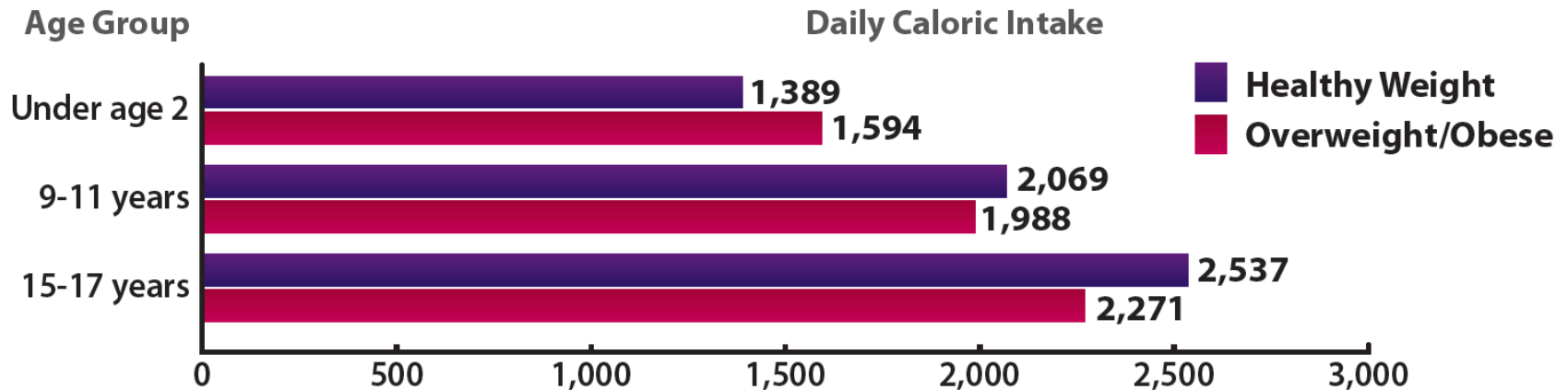
Inactivity Starts Early



Participation in child care only mildly affected frequency of outdoor play time; only 58% of children not in child care experienced outdoor play time daily.

A recent study of preschool children found that only slightly more than half spend time outdoors with one or more parents on a daily basis

Importance of Exercise



According to a recent study, healthy-weight children and adolescents generally consume more calories daily than overweight/obese children.

2008 Physical Activity Guidelines for Americans

Adults (aged 18–64)

- ◆ All adults should avoid inactivity. Some physical activity is better than none, and adults who participate in any amount of physical activity gain some health benefits.
- ◆ Adults should do 2 hours and 30 minutes a week of moderate–intensity, or 1 hour and 15 minutes a week of vigorous–intensity aerobic physical activity.
- ◆ Aerobic activity should be performed in episodes of at least 10 minutes, preferably spread throughout the week.

2008 Physical Activity Guidelines for Americans

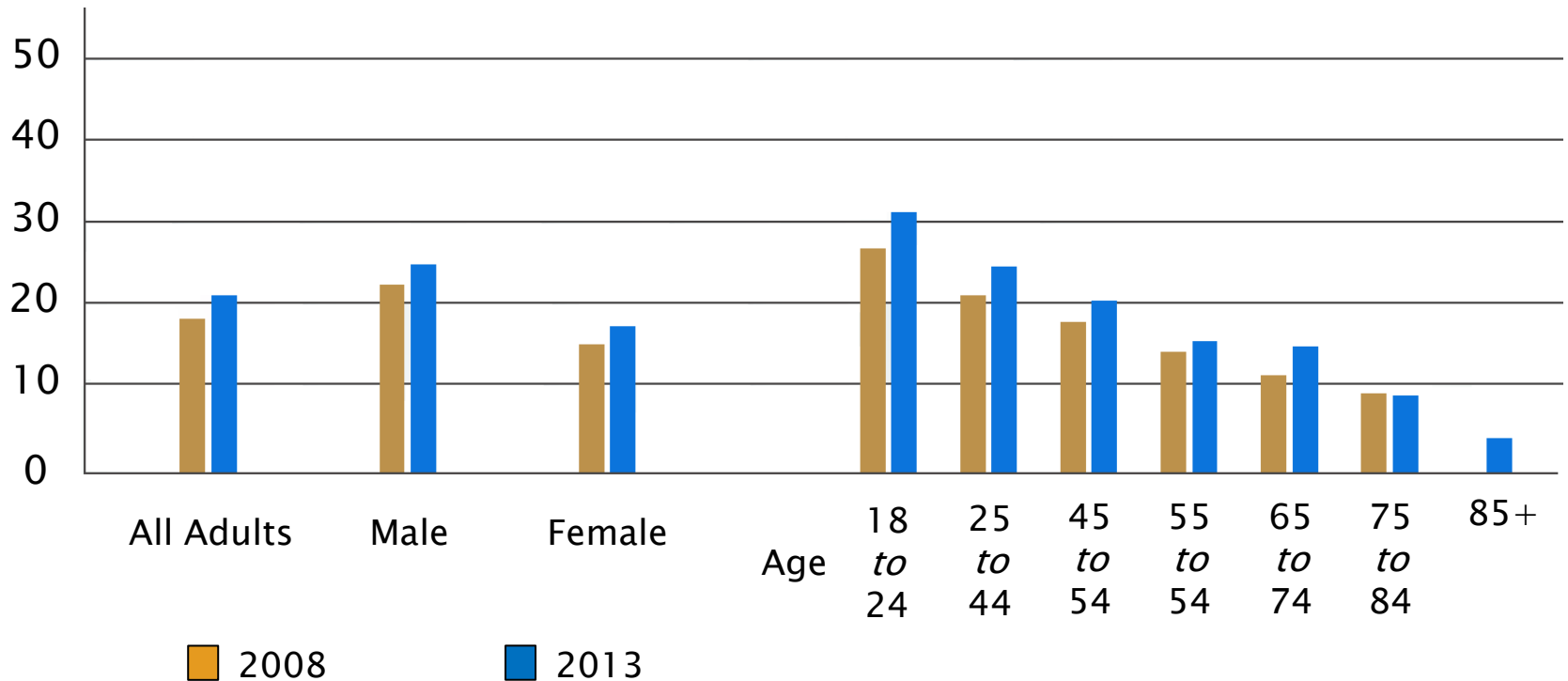
Adults (aged 18–64)

- ◆ Additional health benefits are provided by increasing to 5 hours (300 minutes) a week of moderate–intensity aerobic physical activity, or 2 hours and 30 minutes a week of vigorous–intensity physical activity.
- ◆ Adults should also do muscle–strengthening activities that involve all major muscle groups performed on 2 or more days per week.

2008 Physical Activity Guidelines for Americans Older Adults (aged 65 and older)

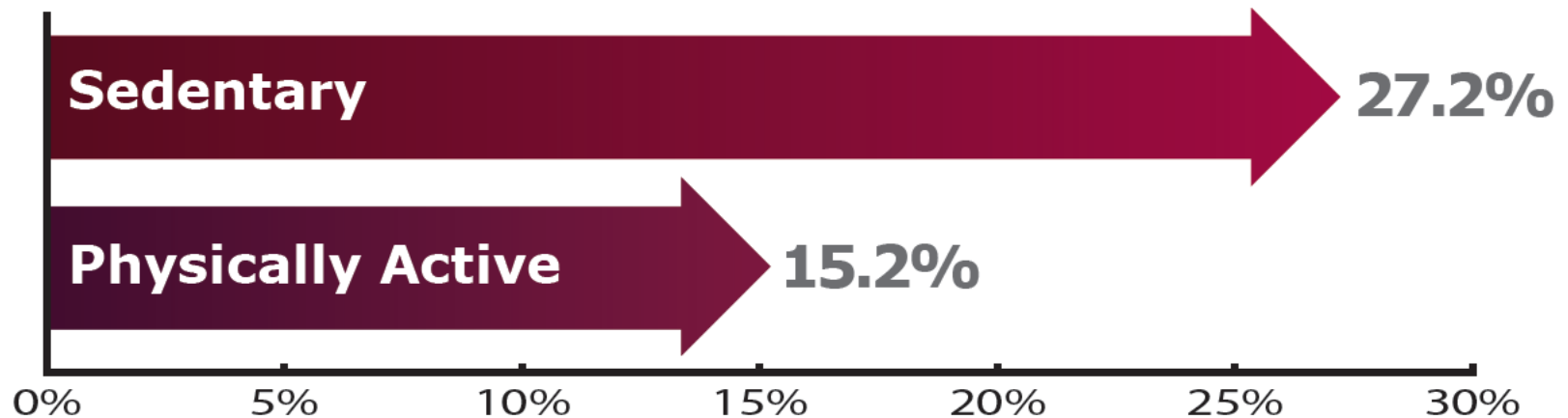
- ◆ Older adults should follow the adult guidelines.
If this is not possible due to limiting chronic conditions, older adults should be as physically active as their abilities and conditions allow.
- ◆ Older adults should avoid inactivity.
- ◆ Older adults should do exercises that maintain or improve balance if they are at risk of falling.

Percent of Adults meeting PA Guidelines (Aerobic & Muscle-Strengthening Recommendations)



Physical Activity for Older Adults

Mortality Rate (%)*



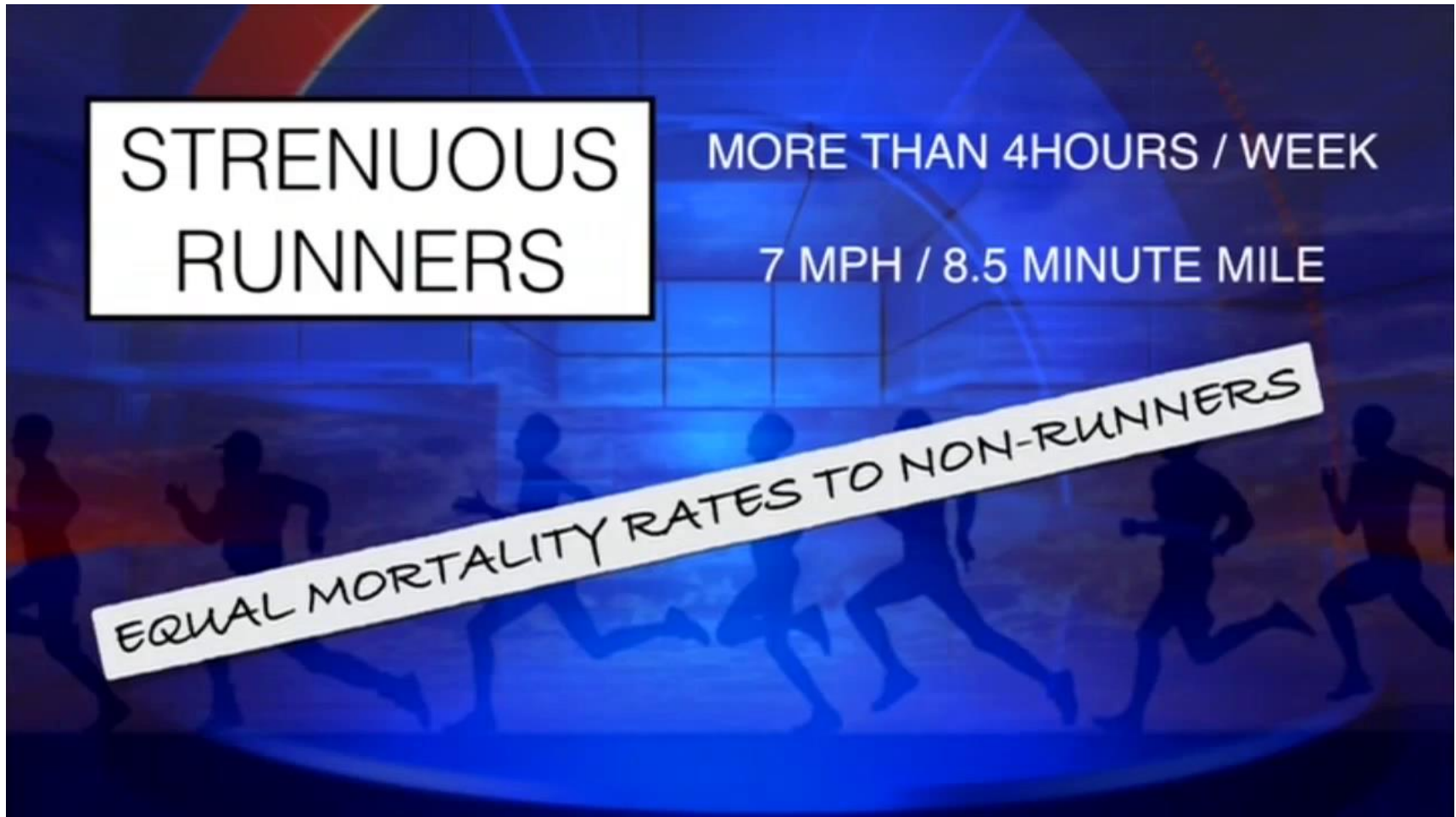
*Eight-year mortality rate; age 70 at baseline.

Although the mechanism of the survival benefit is most likely multifactorial, one important finding was the sustained protective effect of physical activity against functional decline.

Physical activity, function, and longevity among the very old.

Arch Intern Med. 9-14-09;169(16):1476-83 <http://www.ncbi.nlm.nih.gov/pubmed/19752405109>

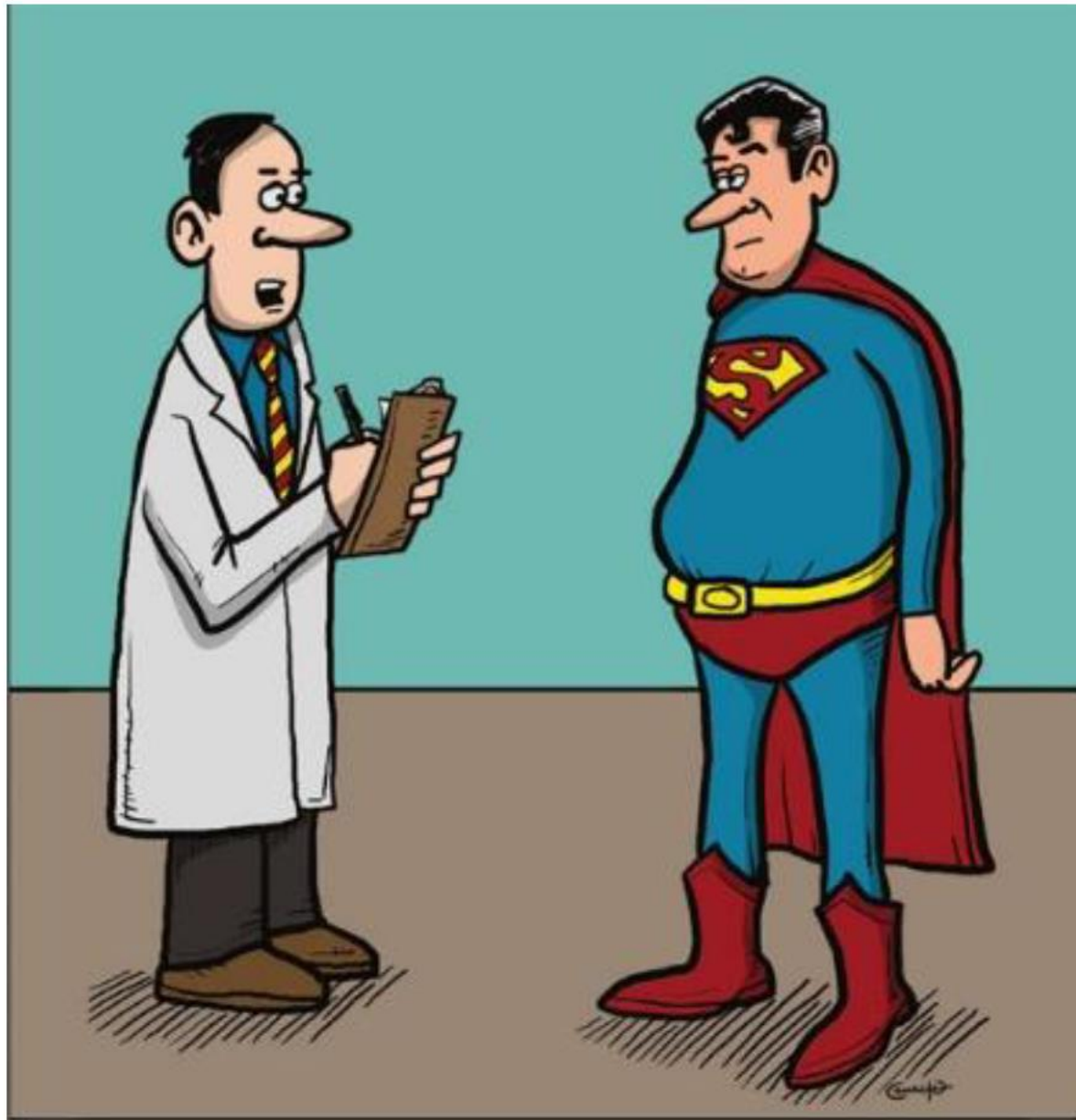
Running vs. Jogging



https://www.youtube.com/watch?v=F-s_NLOBvbY

Dose of Jogging and Long-Term Mortality – J Am Col Cardiology 2-10-15

<http://www.sciencedirect.com.ezproxy.parker.edu/science/journal/07351097>



“You need to stop flying and start jogging.”

Walking – An Ideal Exercise?

- ◆ Requires no special skills or equipment
- ◆ Achievable by virtually all age groups
- ◆ Little risk of injury
- ◆ Better compliance than with more intense exercise



Walking & Coronary Heart Disease



Counting Steps with Pedometer

- ◆ Inexpensive
- ◆ Easy to use
- ◆ Motivates to exercise more
- ◆ Tracks of amount of exercise
- ◆ DC can set goals with an exercise Rx



Pedometer users walked more than 2,000 additional steps each day than nonusers, and their overall physical activity levels increased by 27%.

Physical activity

The following activities have similar benefits to health:

Washing and waxing a car for 45–60 minutes

Washing windows or floors for 45–60 minutes

Playing volleyball for 45 minutes

Wheeling self in wheelchair for 30–40 minutes

Bicycling 8 km in 30 minutes

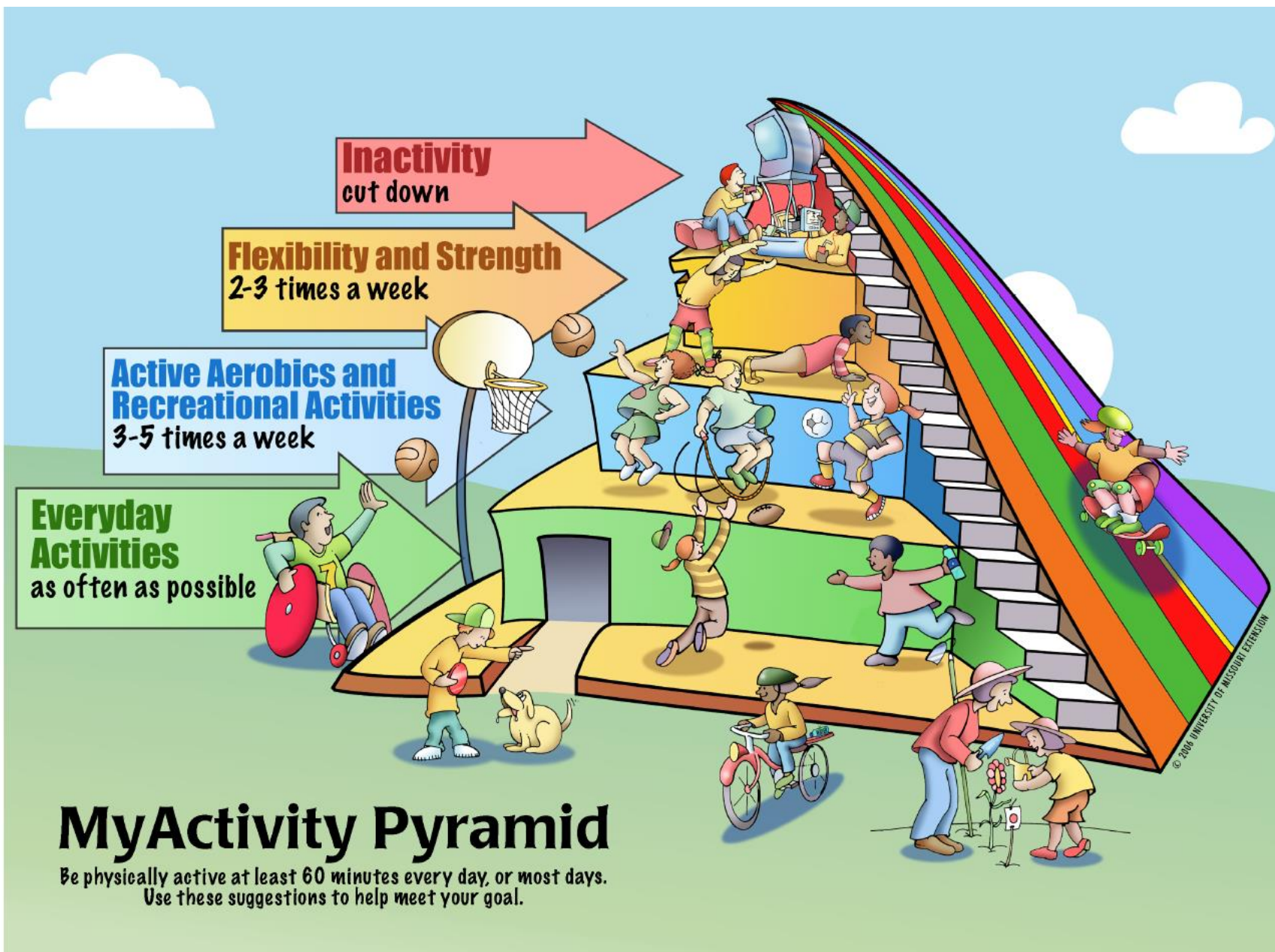
Pushing a pushchair 2.5 km in 30 minutes

Walking 3 km in 30 minutes

Swimming laps for 20 minutes

Playing basketball for 15–20 minutes





Selecting an Activity

- ◆ Choose any rhythmic, continuous activity that uses large muscle groups and can be performed for extended periods of time
- ◆ Select activities based on:
 - Personal objectives
 - Skill level
 - Availability of equipment and facilities
 - Availability of instruction
 - Climate
 - Interests

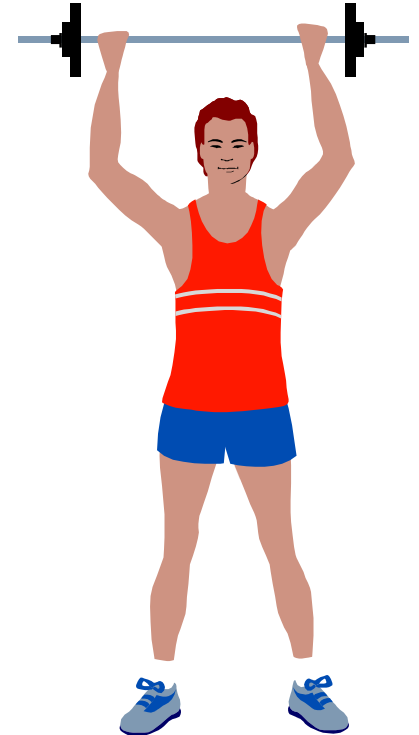


Selecting an Activity

- ◆ Lifetime sports such as tennis, badminton, and racquetball are more conducive to fitness development than team sports, such as football, basketball, and soccer
- ◆ The President's Council on Physical Fitness and Sports states that self-paced fitness activities, such as jogging, cycling, walking, and swimming contribute the most to general well-being

Selecting an Activity

- ◆ Cross-training is the participation in a variety of activities for the purpose of developing physical fitness
- ◆ Cross-training relieves boredom and reduces risk of stress-related injuries
- ◆ Don't “play yourself into shape”; get into shape to play



Warming Up for Exercise

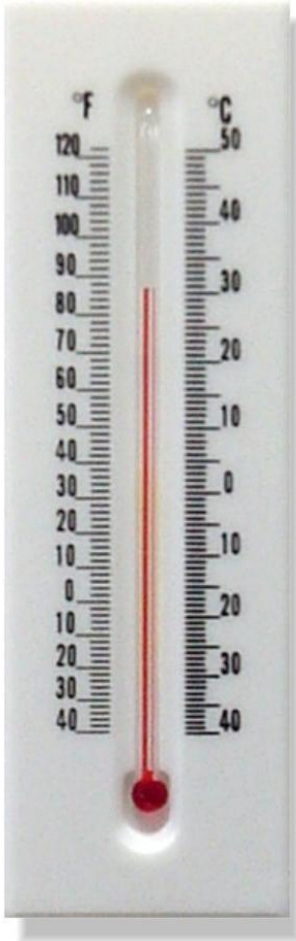
- ◆ The purpose of warm-up is to prepare the body for activity
- ◆ Heart rate should gradually increase and the person should start to sweat
- ◆ Warm-up can be tailored to the activity and should last about 5 to 10 minutes
- ◆ Passive warm-up should not be used to replace active warm-up
- ◆ Stretch only after warming up

Cooling Down from Exercise

- ◆ Cooldown should last about 8 to 10 minutes
- ◆ First, walk or do some other light activity; then finish with stretching exercises
- ◆ Cooldown boosts circulation needed for recovery, reducing stress on the heart
- ◆ Cooldown speeds the removal of lactic acid which causes muscle fatigue



Environmental Heat–Related Conditions



- ◆ Physical activity increases body heat levels
- ◆ Hyperthermia: Abnormally high body temperature that can cause illness or death
- ◆ Heat exhaustion: A serious condition characterized by dizziness, fainting, rapid pulse, and cool skin
- ◆ Heat stroke: A life–threatening, medical emergency

Hydration and Fluid Consumption

- ◆ Dehydration – excessive water loss
 - Can lead to inadequate oxygen delivery
 - Results in lowered blood volume
 - Creates inability for body to dispel heat
- ◆ Helpful Hints
 - Thirst not good indicator of dehydration
 - Drink 6–8 oz. every 15 minutes during exercise
 - Replace fluid after exercise
 - Each pound of weight loss represents about 1 pint of fluid loss
 - If exercising > 60 minutes, mix sugar and sodium with water



Guidelines for Exercising in the Heat

- ◆ Take precautions when the temperature is above 80°F or the relative humidity is above 60%
- ◆ Allow yourself time to acclimate to the heat and keep your body's fluid levels normal
- ◆ Modify your program
- ◆ Don't take salt tablets
- ◆ Use sunscreen if it's sunny or hazy
- ◆ 30 minutes of jogging during rush hour traffic in an urban environment may increase exposure to carbon monoxide in a way that is equivalent to smoking half a pack of cigarettes



Exercising in the Cold

- ◆ Hypothermia: Abnormally low body temperature
- ◆ Frostbite: Can cause permanent damage or loss of a body part due to gangrene
- ◆ When exercising in the cold
 - Protect exposed skin
 - Use a stocking cap to cover your head
 - Dress in insulating layers of clothing



Straighten Up America

- ◆ Straighten Up America is a series of exercises created by Dr. Ron Kirk of Life University.
- ◆ They are designed to be performed daily to enhance the spinal health of your patients.

